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VIEWS, NEWS AND INTERVIEWS.

An electric railway engineer, who is familiar with modern power-house construction, has a great scheme for a Summer club which one day may prove a reality. His proposition is to purchase a piece of land down in New Jersey or on Staten Island where a good water front can be secured. Then a club composed of six or eight bachelor electricians is to be formed and money provided to build a house. The originality of the scheme lies in the construction of this house. It is to be of steel skeleton frame construction and the walls and partitions are to be of fireproof tiling. This, the engineer says, will provide a house that will be cool in Summer and warm in Winter, besides being fireproof. The cost of building is little more than a frame structure. Each member of the club would have his own room; there would be a few guests' rooms and a large general lounging room on the first floor.

The town of Bromley, Ky., opposite the west end of Cincinnati, is being fenced with barbed wire by the South Covington and Cincinnati Street Railway Company, which wishes to prevent the people living there from using its cars and discourage others from visiting the town on Sundays. The 300 inhabitants of Bromley are incensed by the move. The railroad officials say they have taken this summary action in order to stop the establishment of free gardens and similar resorts for Sunday visitors. They do not propose, they say, to carry the rough element of Cincinnati, Covington and Newport on Sundays even if paid for it.

Electricity has a new use, to which it has been put in a dark Connecticut swamp. Some four months ago the wife and eight-year-old son of a farmer of that place disappeared. Bloody clothing was found in the house and the farmer was arrested. The swamp is about a mile from his home and the officers believe the bodies of the woman and boy were concealed there. Two electric search-lights of 3,000 candle-power are being used in an examination of the swamp.

James C. Church, counsel for the Nassau and Kings County Electric Railroad Companies, whose charters were recently declared void, performed an unusual feat last week. He dictated the printed case on appeal, consisting of 424 pages, in 36 hours. While at work on it he did not leave his desk except for meals.

Last week Prof. Alexander Graham Bell appeared in the Jefferson Market Police Court, New York city, to assist in the prosecution of a swindler of the name of Edgar A. Washburne, who had tried to obtain money from a jewelry firm on the assertion that he was Professor Bell's representative in New York. He used a badly punctuated letter, purporting to be written by Professor Bell, setting forth that the telephone man wanted him to investigate the jewelry business, as he intended to invest $25,000 in it. Professor Bell has been receiving letters for the past two years from people in New York city who said they were swindled by a man who said he was his agent. Professor Bell says he wrote to the Superintendent of Police about the swindler without result.

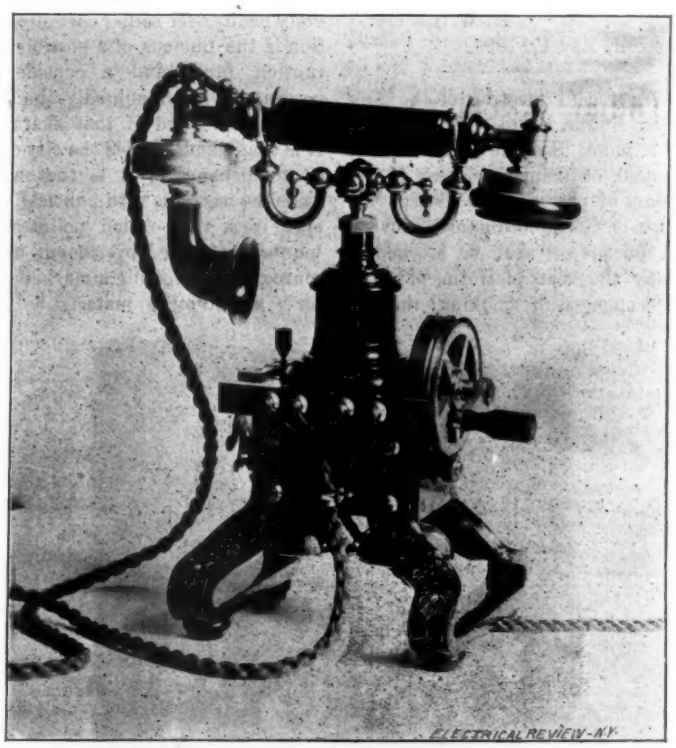


FIG. 1.—MUTUAL AUTOMATIC TELEPHONE COMPANY'S IMPROVED DESK SET.

Who Supplies Non-Magnetic Devices for Watches?

TO THE EDITOR OF ELECTRICAL REVIEW:

I have a good watch but it is magnetized. Can you tell me where I can get a non-magnetic attachment for it? Yours truly,

B. E. K.

New York, May 15.

The Montreal Park & Island Railway, of Montreal, Que., will add considerable new rolling stock to its equipment for the Summer season.

THE MUTUAL AUTOMATIC TELEPHONE COMPANY.

THE INSTRUMENTS WHICH THIS COMPANY PROPOSES TO INTRODUCE IN NEW YORK CITY—THE PLANS OF THE COMPANY.

The ELECTRICAL REVIEW presents on this page an excellent picture of the improved desk set of the Mutual Automatic Telephone Company, of New York city. Illustrations of the Strowger automatic switchboard, sectional view, and of the wall telephone set are shown on the following page. The desk set possesses some novel features, and in its design is different from anything we have seen. The head telephone and transmitter are of aluminum set in a handle of hard rubber. This makes them very light and graceful. It is claimed for the transmitter that it is not supersensitive, and when once adjusted will stay so indefinitely. The transmitter and receiver, as will be noticed, are in one piece, thus avoiding the liability to get too near or too far away when talking. All the exposed parts are nickel-plated, and the outfit set on an iron base to prevent its being topheavy. The keyboard is shown on the side. This gives a neat appearance to the very compact instrument. In connection with the automatic switch it has an attachment which releases the switch by the weight of the receiver. The company intends to manufacture a cabinet set, in addition to the wall and desk sets shown. The Strowger switchboard is now manufactured in Chicago, but the Mutual company expects soon to manufacture all its apparatus in the East.

The Mutual Automatic Telephone Company has been organized for the purpose of establishing a telephone system in the city of New York, and owns the license for the exclusive use in the city of New York of the Strowger automatic switch. An exchange has been installed at the offices of the company in the Mills Building, where it can be seen at any time in practical operation. Communication between subscribers under this system is effected in the usual

way; that is by the use of the ordinary transmitter and receiver. It is by the automatic switch that direct and immediate connection is made. The switches are so arranged that each one can be placed in electrical contact with every other one, in turn, at the will of the subscriber; thus, the facility of inter-communication is secured and placed under individual control, and is not subject to the operators in the central office.

The switch is worked by push buttons on the telephone in the subscriber's office. The method of "calling up" or making connections is probably well known to most of our readers and is as follows:

Each telephone has push buttons marked respectively, "units," "tens," "hundreds," "thousands." When a subscriber requires any number, he presses the buttons for that number. The pressing of the buttons works his switch on the board in the exchange, and puts it in direct and immediate contact with the switch corresponding to the number he calls.

Each subscriber operates his own switch, alone, and cannot in any way interfere with any other switch on the board. Metallic circuits will be used with this system, which the Mutual company expects to introduce in New York, and is now canvassing for subscribers on the basis of a five-year contract at a rental of $120 per annum. Before beginning operations the company agrees to have 10,000 subscribers and stipulates in its contract that it does not agree to furnish service until it has secured rights for its wires in New York city.

The officers of the company are the following named gentlemen:

J. Wesley Allison, president; Silas B. Dutcher, first vice-president; John C. McGuire, second vice-president; A. B. Macklin, secretary; Henry N. Whitney, treasurer; Smith M. Weed, chairman of the board.

Among the directors are Dr. W. Seward Webb, Hon. David A. Boody and Col. John Jacob Astor.

Cable Railways Can Run Wires in Their Own Conduits.

The general term of the Supreme Court on May 17 affirmed the judgment of the lower court dismissing the suits brought by the Empire City Subway Company to restrain the Broadway & Seventh Avenue Railroad Company and the Columbus & Ninth Avenue Railroad Company from using their cable conduits for the reception of telegraphic or telephonic conductors on the line of their roads in New York city. Judge Follett said that if the construction of the subway statutes, contended for by the plaintiff, was to prevail, it would be impossible for a surface road to be operated on many of the streets by electricity, as authorized by chapter 531 of the Laws of 1889, unless its conductors were placed in the plaintiff's subways.

The dynamos recently installed in the Union Street Railway Company's new power house at Saginaw, Mich., are in successful operation.

The Oldest Electrical House.

To the Editor of Electrical Review:

I have read your article on the "oldest electrical house" and beg to say that I have a price list for 1876, issued by Charles Williams, Jr., 109 Court street, Boston, Mass., on which is printed "Established 1856," which is 39 years ago. Mr. Williams sold

Fig. 2.—Wall Telephone Set of the Mutual Automatic Telephone Company.

his business to the Western Electric Company, and the Western Electric Company to Mr. A. L. Russell, and Mr. Russell to Messrs. Gillis & Gleeson, who are still associated in the same business.

Yours truly,
N. W. Lillie.

Boston, May 17, 1895.

At a recent meeting of the New Haven, Conn., Board of Councilmen, Councilman Scoville introduced a proposed ordinance relative to the conduct of passengers on street railway cars. The ordinance provides that no person shall be allowed to occupy the rear platform of a car unless engaged in smoking; that not more than five persons beside the conductor shall be allowed to occupy the rear platform; that any person occupying the rear platform and obstructing the ingress or egress of passengers shall be deemed as having committed a misdemeanor and be fined $10 for each offense; that any person who refuses to enter a car when requested to do so, unless he be smoking and there are not more than five occupying the platform, shall be considered a violation of the ordinance and be liable to a fine of not less than $2 or more than $10 for each offense.

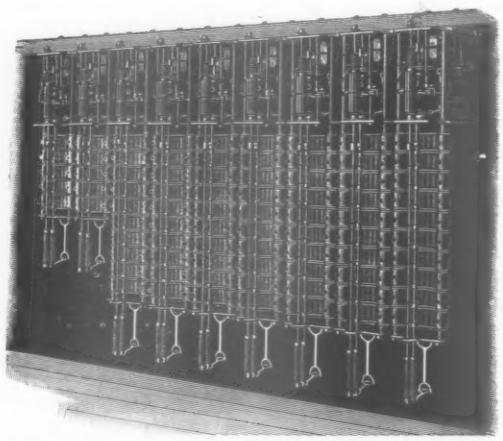


Fig. 3.—Strowger Automatic Switchboard Used by the Mutual Automatic Telephone Company.

Views on Municipal Ownership.

To the Editor of Electrical Review:

The interesting article in your issue of May 8, based upon the municipal lighting plant of Manchester, England, and drawing somewhat odious comparisons between the conditions prevailing in that city and those of American municipalities, especially New York, ignores certain considerations which are amply sufficient to account for the difference in conditions which you note. Without attempting a complete statement of all those considerations, I shall be glad if you can find room for a few words as to the chief and controlling one.

You say that, as a rule, English municipal government is characterized by honesty, efficiency and permanent solidity of work, and you more than intimate that the contrary is the case on this side of the water, where city councils are made up of criminals or quasi-criminals, to whom municipal ownership would be literally a golden opportunity. Such a statement undoubtedly mistakes effect for cause. If British city government is honest and efficient it is so because of and just in proportion to the extent to which public ownership of public functions has there been carried. Private ownership of those functions breeds dishonesty as naturally as filth breeds disease. When we pay our five cents for a single fare or our dollar for a thousand feet of gas, every penny over actual cost of operation is the nucleus of a possible corruption fund, and a considerable percentage is undoubtedly the basis of an actual fund of that character. It is that which tempts the city council to dishonesty; it is that which loads the pay-rolls with political heelers; it is that which pollutes the fountain of free government at its source by establishing a market price for "mere voting material." It is the ability to charge all the traffic will bear which furnishes to the private owner the sinews with which to carry on the perpetual war of competition with rivals, the conquest of new fields and the struggle for existence against a constantly growing adverse public sentiment. Without that fund his corrupting power would be gone.

To look at the matter from your point of view is not only to maintain the failure of self government; it is utterly unscientific and out of joint with modern progress, and social evolution. Modern sanitary science does not deal with a cholera epidemic or a yellow fever scourge by accumulating garbage heaps and laying out new sewers to deliver into the public water supply, but by removing these things if they exist. The moral plague of municipal corruption should be and can be dealt with in the same way and in that way only. There is no cure for it; but there is a perfect means of prevention, ready at hand and clearly pointed out by our own limited experience as well as by a great mass of experience abroad—for there is nothing more certain than that English cities which have taken over their municipal functions had previously had a bitter experience, differing only in degree from that of New York, and that those which still leave those functions in private hands are also still enjoying their bitter experience. One may safely wager that many an English city councillor is honest only because he has to be; and his opportunity to be otherwise is year by year growing less for the same reason that caused the ancient prototype of the modern horse to lose his superfluity of toes. Industrial competition being a social organ which has outlived its usefulness. Nature is without compunction consigning it to the same limbo as the equine toes of old.

In conclusion the article which has called forth these observations is the more remarkable as appearing in a paper published in a city which has so good an example to the contrary as is furnished by the Brooklyn bridge. Let the editor compare on the one hand the history of the latter structure with its progressive reduction in fares and expense of maintenance, and its progressively better conditions for employés, and on the other that of the elevated roads, and I have little doubt he will modify his opinion as to the source of municipal corruption. W. W. T.

Washington, D. C., May 10, 1895.

BOOK NOTES.

"Practical Telegraphy," by F. E. Wessels, price 50 cents, is a book for self-instruction. It contains the elementary principles of the art, tersely stated, besides a brief reference to the Phillips code for typo-telegraphy.

"Telephone Troubles and How to Find Them," by W. H. Hyde and J. A. McManman. Paper, 51 pp., illustrated, sixth edition. Price 25 cents. Sent postage free on receipt of price by the Electrical Review Publishing Company, 13 Park Row, New York.

This is a handbook designed to be a complete work for the use of telephone inspectors and others. The new sixth edition has been formally edited by Prof. C. H. Haskins. The matter is conveniently arranged and clearly stated. Considerable additions have been made to the sixth edition. The book is a valuable one of its kind, as is shown by the large demand for it.

ACCUMULATOR BATTERY FOR TELEGRAPHIC PURPOSES — DIRECTIONS FOR INSTALLATION AND MAINTENANCE.

BY HARRY HOFMEISTER, IMPERIAL GERMAN TELEGRAPH DIRECTOR, EMDEN, GERMANY.

The cell is of the ordinary accumulator pattern, but of smaller size, and contains one positive and two

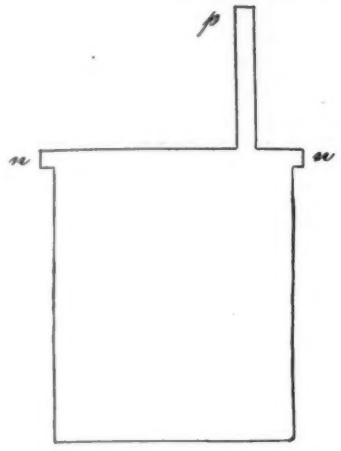


FIG. 1.—PLATE OF ACCUMULATOR BATTERY FOR TELEGRAPHIC PURPOSES.

negative plates, each 12 centimetres high, 9.5 centimetres broad and from five to six millimetres thick.

Each plate (Fig. 1) has two small projections *n* and one long narrow tongue *p*, the latter being used to form connection with the adjacent cell or to act as a pole of the battery.

The cell itself is a square vessel of molded glass, having three grooves running from near the top to the bottom of two opposite interior sides, Figs. 2 and 3.

The top part of the vessel is widened out, forming an inner shoulder *b*, on which the projections *n* of the metallic plates rest.

The cell is provided with a glass lid furnished with holes for the tongues of the electrodes and for replenishing the liquid. In preparing the cell, the positive plate (colored brown on black) is placed in the center groove *a*, Fig. 2, the two negative plates (colored gray) in the out-

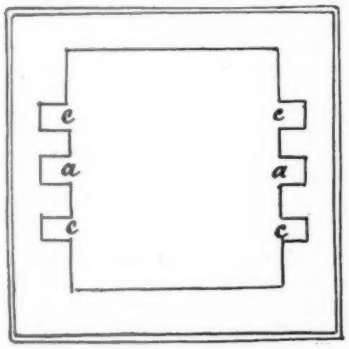


FIG. 2.—PLAN VIEW OF CELL.

side grooves *c* and in a position opposite to that of the positive plate, so that the tongues of the negative plates stand up in line at one side of the cell, that of the positive plate standing up alone at the other side.

The projections *n* of each plate rest on the shoulder *b*, Fig. 3.

The vessel is now filled to within a short distance of the top with diluted sulphuric acid (specific gravity 1.162 = 20 degrees Beaumé). The tops of the plates should be well covered with the liquid. The lid is now placed on and the cell is ready.

Connection between the cells is made by short bars of hard lead, shaped as in Fig. 4. These are placed sideways, with the notches against the tongues of the electrodes, in such a way that the two negative plates of each cell are connected with the positive plate of the adjacent one. The bars should always be placed from the same side against the tongues. Fig. 5 gives a top view of the connections between the cells.

The points of contact on bar and tongues are soldered together by the following process:

The leaden bars are laid for a few hours in a solution consisting of about 100 grains potash in one litre of water, in order to prevent oxidation, and then rubbed dry with a cloth.

Immediately before soldering, the point of contact, *i. e.*, the notches in the bars and the tongues of the electrodes, must be thoroughly filed and cleaned.

The tongue is now placed in the notch so that its top is level with the upper surface of the bar. A specially

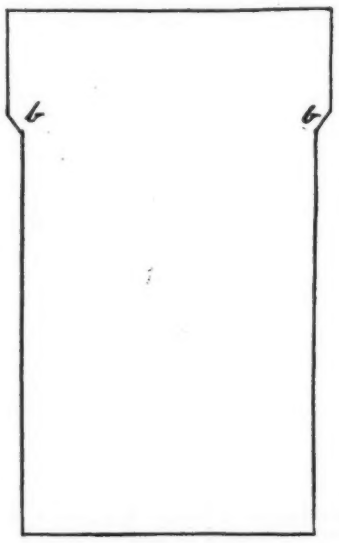


FIG. 3.—ELEVATION OF CELL.

designed tongs holds the pieces in this position, at the same time forming a hollow iron cup around the junction. Into this receptacle molten lead of similar kind to that of which the bars are made is poured. The metal for this purpose should be melted in a large soldering ladle over a Bunsen burner and brought to such a degree of heat that, on being poured into the tongs, the surface of the two metals to be connected should be fused, and a perfect metallic union established. The proper temperature is generally reached when the ladle becomes red-hot, but should be tested by letting a few drops of the metal fall on a piece of clean hard lead. The drops should completely unite with the bar and not be capable of

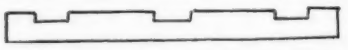


FIG. 4.—CONNECTOR FOR JOINING CELLS.

separation. This test should be repeatedly carried out before beginning the process in order to attain practice in judging the necessary temperature.

Any roughness or irregularity on the surface of the joint after removing the tongs must be removed by breaking off and filing.

A piece of asbestos card or cloth should be laid on the glass lid of the cell to prevent the molten metal falling on it. Great care must be taken that the tongues or poles of the cell be not touched simultaneously with any metal, ladle, file, etc., or short

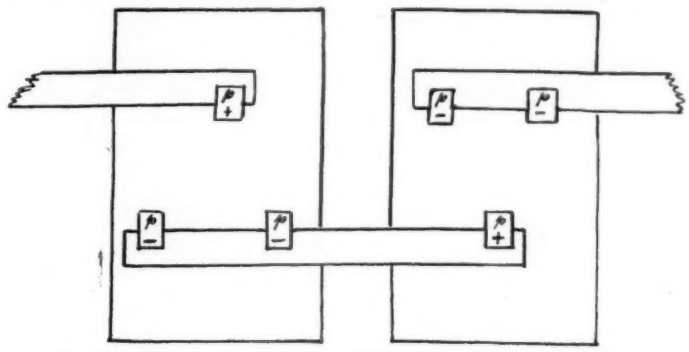


FIG. 5.—DIAGRAM SHOWING USE OF CONNECTORS JOINING CELLS.

circuit will be set up. The pole ends should be wrapped in pieces of dry cloth during the soldering.

The cells should be arranged 10 in a row on the shelves of the battery cupboard. The process of soldering should as far as possible be carried out on a work table close to the cupboard.

The cells are soldered in pairs and placed in the cupboard in the order as shown in Fig. 6. The connection between the positive pole of the first cell and the two negative poles of the second is to be made at the table, and the two cells then placed on the shelf. The connections between the positive pole of the third cell and the negative poles of the fourth and that between the two negative poles of the third cell are also made at the table and these two placed on the shelf. Each succeeding pair is treated in the same way. By this arrangement the number of joints to be made in the cupboard is reduced to the minimum; that is, four in each row, as shown by *a* (Fig. 6), all of which are in the front of the shelf and easily accessible.

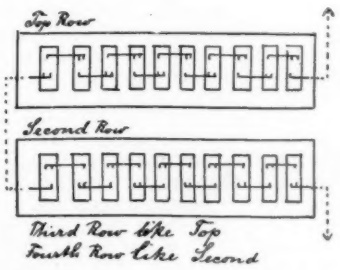


FIG. 6.—ARRANGEMENT OF CELLS IN CUPBOARD.

After the contacts are so made the bars and tongues must be coated with black varnish.

Connection between the several rows is made by insulated wire. The free pole at the end of each row is soldered by the above process to a short bar of lead, at the other end of which a shallow groove has been filed. A short piece of copper wire is laid in the groove and soldered in, after having previously been dipped in soldering water then drawn through molten lead. The other end of the wire is now soldered in the ordinary way to two wires, one leading to the next row of cells, the other to the distributing bar. The joints should be carefully coated with black varnish. In no case are these connections to be made by screws or clamps.

As above stated each row of ten cells is connected by wire with a distributing bar, from which the connections with the individual circuits are led. This is more fully described hereafter.

THE BATTERY CUPBOARDS.

The cupboards in which the accumulator cells are to be kept should be made of pitch-pine, two metres high, 1.20 metres broad and 28 centimetres deep. The inside should be painted white, the outside the natural wood color. The back wall of the cupboard is to be paneled, the front furnished with glass doors provided with lock and key. The doors must open outwards and make a clear opening of 1.10 metres. Four shelves, each 26 millimetres thick, divided

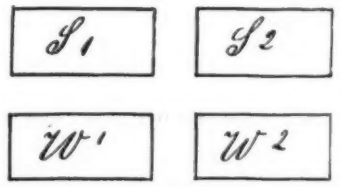


FIG. 8.—GROUP OF RESISTANCE CUPBOARDS.

lengthways into two parts, are placed in each cupboard. To ensure perfect insulation rods of ebony of the same length as the shelves are fastened to the surface of the latter, two to each shelf. On these rods the cells rest. The division of the shelf into two parts is for the purpose of ventilation and to allow the escape of gases.

The floor of the cupboard should be similarly divided and the roof should open into an oblong box with sides of wire gauze. A cupboard of this size will contain 40 cells.

For a battery of 80 cells, two similar cupboards should be used.

The safety resistances, hereinafter described, are placed in cupboards similar in appearance and dimensions, but without the ebony rods and the ventilating arrangements. The cupboards are grouped as in Fig. 8, S^1 and S^2 containing the cells, one pole of the battery in S^1 being joined to earth.

W^1 and W^2 contain the resistances, W^1 those of 20, 40, 60 and 80 ohms; W^2 those of 100, 120, 140 and 160 ohms. The cupboards are placed back to back, a space of 40 centimetres being left between to allow access to the leading-in wires. All the latter are brought to and fastened in due order on the backs of the cupboards, connection with the interior being made by holes bored through the back walls. The wires connecting the battery and resistances must not be led direct by the shortest way, but taken up and overhead.

The cupboards should not be placed in rooms where persons are regularly employed.

(To be continued.)

A METHOD FOR PREVENTING ARMATURE REACTION.

READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, NEW YORK AND CHICAGO, MARCH 20, 1895, BY HARRIS J. RYAN AND MILTON E. THOMPSON.

DISCUSSION.

(Concluded from Page 258.)

Dr. Charles E. Emery: I have made a large number of experiments on the general subject of armature reaction, and have seen the electromotive force reversed in a half cycle even worse than shown in the paper, where the polar surfaces of the field magnet were too large for the exciting force employed. With larger exciting forces the reversal did not take place. Referring to the proposed shifting of the brushes in lieu of compounding with coils, I frequently have been annoyed at seeing the tenders of the old bipolar dynamos continually shift the brushes to try and reduce trifling sparks, with the result that the attendant on the switchboard platform had to make corresponding changes of his field regulators. In this connection I finally made a fairly elaborate series of experiments with modified windings designed to produce a neutral arc through which the brushes could be shifted for the purpose of compounding exactly as proposed in the paper. The sparkless arc was not successfully obtained, though the results were encouraging. About this time I had an opportunity to shift the brushes on one of the new General Electric generators when well loaded, and found that very considerable changes in the voltage could be obtained by shifting the brushes without producing sparking. It appears, therefore, that dynamos are now so well designed that additional features would ordinarily not be warranted. If, however, the improved details now proposed, greatly increase the capacity, this will furnish the desirable commercial feature to enable one bidder to guarantee a given overload at a lower price than another.

In any event, Professor Ryan, not neglecting the co-author, again deserves our thanks for a record of careful experiments, revealing the underlying principles of interesting and important phenomena, and it will be pleasing if the devices designed to overcome well-known difficulties prove of considerable commercial value.

Mr. A. E. Kennelly: The question at issue in this case seems to be not the question of the number of watts which can be obtained per pound of material, or, at least, that is not the primary and essential question. The primary and essential question in an engineering matter must be, what is the number of watts of output that can be permanently sustained per dollar of investment in the machine, and per dollar of up-keep and yearly maintenance, including depreciation and repairs. We all know that dynamos and motors spark. It is always a question whether the output of a dynamo or a motor is reached in its heating before it is reached in its sparking, and one of the two conditions must supervene to limit the output of the machine. In the modern practice it is the heating which limits the output, and not the sparking. But that does not altogether settle the question, because if it can be shown that by differences in construction, or in superiority of methods of ventilation, the heating temperature of elevation can be reduced, to enable the machine to be carried forward to a greater limit of output, so as to bring the question of sparking under consideration, then there is room for any device which checks and prevents sparking. The question can only be decided, it seems to me, by actual experiments, and by actual estimates based on such experiments. The only guide we have in the paper before us as to the actual results possible, is in the statement that 20 to 30 watts per pound of total dynamo weight can be obtained by the method in use, and, as a rule, whatever exceptional dynamos may do, that is a greater output than standard machines to-day possess. I think the figures given for this machine described in the paper do not show anything like such an output, so that I think the figures are based on estimates, and not based on actual experience. Many attempts, as we all know, as the patent records show, have been made to overcome armature reaction, very frequently by adding lugs over the point of commutation in the armature. But I do not remember seeing any method quite so radical as this, which consists in providing two armature windings, one of which is intended to rotate, and the other to remain fixed.

Turning to the purely technical side of the subject, an interesting question appears to arise. We know that when a smooth-cored armature is employed in a dynamo-electric machine, say a motor, the force which propels the motor when the electric current is supplied to the armature, *i. e.*, the electro-dynamic force, is exerted on the substance of the conducting wires, and if they are not firmly secured to the armature body, they are liable to be forced or sheared electro-dynamically over the armature surfaces. The only function of the armature core, from a magnetic point of view, is to reduce the reluctance of the magnetic circuit through the armature. and increase the intensity of the magnetic field which reacts upon the active conductors.

When, however, the armature is tooth-cored, and the same conductors lie deeply imbedded in the iron surface of the armature, it is, I think, the general belief that, since the conductors lie in a space comparatively unoccupied by flux from the field magnets—since the flux passes through the core of the armature without penetrating the substance of the conductors — that the current passing through these conductors magnetizes the iron of the core, and converts it, so to speak, into an electro-magnet whose poles are attracted by the poles of the field magnet. In fact, it is sometimes claimed that the use of tooth-cored armatures not only prevents eddy currents from being developed in the armature conductors, but also removes from them the driving force, to the greater mechanical safety of their insulating coating.

In the experiments described in this paper, however, and as shown in Fig. 1, on page 158, the balancing coils, having a magneto-motive force equal and opposite to that of the armature winding, must completely or nearly neutralize the magnetic influence of the armature winding upon the armature core, so that the iron of the armature does not become magnetized, like an electro-magnet, by the action of the armature current. This is further evidenced by the series of observations presented in Figs. 10 and 17, in which it appears that the distribution of the flux over the surface of the active armature is sensibly the same as when the armature remains inactive. From this it would appear that if the armature winding were mechanically free from the iron core in which it lies imbedded, it would rotate, or tend to rotate, with the full torque of the machine, leaving the core at rest within; also that the balancing coils attached to the field poles tend to rotate about the axis of the armature in the opposite direction. If this reasoning be correct, it would seem necessary to suppose that in this. and, therefore, in any tooth-cored armature, the electro-dynamic force is exerted upon the substance of the conductor and not upon the substance of the iron core, and I would like to ask Professor Ryan for the opinion he has formed upon this question from his study of the phenomena.

Mr. Gano S. Dunn: With regard to the high densities in the teeth, I would call attention to the fact that such densities are necessary only when we depend on shifting our brushes to stop the sparking. But if in a machine of small size we do not depend on such means, but depend entirely upon the resistance of the carbon brush to reverse the coil, then a high density in the teeth is a positive disadvantage, since it makes us have so much more magneto-motive force, or copper in our field coils. In a small machine the field energy is a much larger proportion of the input than in a large machine, which makes this an important point; for by letting the density in the teeth remain low we save just so much of what is already a large loss.

Mr. C. O. Mailloux: I would like to state in reply to the remarks made by Mr. Dunn that that statement does not necessarily always apply. I have found, in connection with the very machine which I refer to, which was run in both directions as a motor, that in spite of the very high density, with the set position of the brushes, there was no sparking, although the field excitation was not excessive. I think those things are largely a question of design. The design in this case was a four-pole machine of the consequent-pole type, similar to that which Dr. Hutchinson has described, and that may account in some manner for its wonderful performance.

With reference to the method of balancing devised by Professor Ryan I do not quite agree with my colleague and friend, Mr. Kennelly, that it must be regarded as a stationary armature. I regard it rather, as strictly speaking, a system or set of compounding coils. I do not think we can regard it in any other way; and I think they are an ideal form of compounding from a theoretical standpoint. If we stop to consider compounding, we find that it means, substantially, to add enough extra coils so as to get an increased magneto-motive force sufficient to stiffen the lines of force and make them pass through their path, or to put it differently to overcome the added reluctance due to their distortion. Professor Ryan finds that it is simpler to straighten them. He applies the force at right angles and merely restores the bent lines of force back to their position. I think if we investigate the forces in action, the final result is just the same as if we had a magnetic force acting at right angles with that of the field itself, or, strictly speaking, as Professor Ryan puts it, in opposition to that of the armature. The armature tends to distort the field lines of force at right angles. It is a force acting tangentially to the armature; it bends the lines of force out of their course; Professor Ryan simply bends them back. That, I think, is the ideal method, because it always requires less force to produce the result; same as in mechanics, it is often simpler to use guys and struts, instead of attempting to make the beam itself stronger and stiffer by increasing its size.

Mr. Maxwell M. Mayer: I should like to ask the previous speaker that in case the density of the teeth is exceedingly high, so that the permeability of same is equal to the air, how the quantity of wire and the necessary energy wasted in fields can be such a small amount as he has mentioned.

Mr. Mailloux: I must correct the gentleman. I did not state that. The permeability is something like 25. I was referring to other cases, such as street car motors, where it is not so much a question of saving copper as it is a question of space, and of the equally important matters of proper working under extraordinary conditions. I have not the figures in my mind of the machine I just mentioned, but, if I recollect rightly, the maximum permeability at the time of starting was something like 20.

Mr. Mayer:—I should again like to ask Mr. Mailloux, or any of the gentlemen present, whether they consider using the teeth at very high inductions, and overcoming the armature reactions, more advantageous than using a low density, and decreasing the reluctance of air space to a minimum.

Mr. Mailloux: As I stated previously, I endeavored to have as much as possible of the reluctance in the air-gap. Of course, it goes without saying that the designer should always bear in mind the specific purpose for which the machine is intended, and that he should govern himself accordingly. What may be excellent for one case may be very bad in another case. I cannot answer the question of this gentleman because it would involve the analysis of a great many points, some of which are rather abstruse while others would require access to comparative data.

The President: If there are no other remarks, I will call on Professor Ryan to close the discussion.

Professor Ryan: I have been very much interested in the discussion myself. I have hardly anything to say, I think, in conclusion—possibly one or two words.

I think Dr. Hutchinson was of the opinion that we advocated in our paper the lowest possible densities. Well, I meant by that, when you use the balancing coils, that of course then you do not need to resort to the very high induction densities in the lugs in order to be able to add on series ampere-turns without running up the induction and electro-motive force of the machine. That is what we want to refer to—what we had in mind when we wrote what we did.

With regard to the point mentioned by Mr. Kennelly, as to whether magnetic forces are brought to bear on the armature conductors when pole-face coils balance the armature reactive effects, or whether they are still on the armature lugs, I would explain what my own view is in connection with that matter, because it seems to me that this is a subject of a good deal of practical importance. If the forces, through balancing the reactive effect, are thereby made to be exerted on the conductors, then, of course, one is reverted to a set of mechanical features which are not so desirable. It seems to me, however, that this force, even if one has balanced the effects entirely so that at all outputs of the armature the field is uniform for the pole-face and throughout the air-gap, that the forces are still a kind of drag on the armature core and not on the armature conductors, and the reason why I think so is this: It seems to me that the electro-motive forces that we get there are produced rather by the including and the excluding of induction in one direction and then in the other direction through the armature coils, as is the case in the transformer.

The forces at work on the coils there are those more especially due to the proximity of two coils with currents in opposite directions. We all understand, I think, that great variation of induction occurs at high rates, and large electro-motive forces are produced that set up no forces between the primary coil and the iron circuit. You may have such transformer coils carrying heavy currents at considerable pressures, representing large powers, and yet we ordinarily experience no mechanical action of the iron circuit on these coils. I see no reason why similar results may not be obtained in a dynamo. This is the view I have had of the matter, and I think it is an interesting point brought up in the manner in which Mr. Kennelly has presented it.

Dr. Hutchinson: I do not see how the attraction can be on the teeth, as Mr. Kennelly suggests, for the reason that the magnetization of the teeth does not increase in proportion to the current in the armature and the torque does. Therefore, the pull must be on the conductor carrying the current.

A Dangerous Trio Nabbed.

The following press dispatch was sent out from Indianapolis, Ind., on May 12:

The street railway management has discovered a conspiracy, which is believed to have been worked in a number of cities throughout the country.

Some weeks ago a demand was made upon the company by a man giving his name as Barney Ginsberg, who claimed that his wife had been injured while attempting to alight from a motor car. He expressed a purpose of bringing a damage suit for $15,000. The company had several physicians examine Mrs. Ginsberg, all of whom were unable to find that she had sustained any injuries.

Further investigation revealed that there seemed to be an understanding between Ginsberg and a man registering as Joseph Stein, of St. Louis, who claimed to be a stranger to both Ginsberg and his wife. It was developed. the company's attorneys claim, that Stein and Ginsberg were traveling over the country making a specialty of damage suits against railway companies.

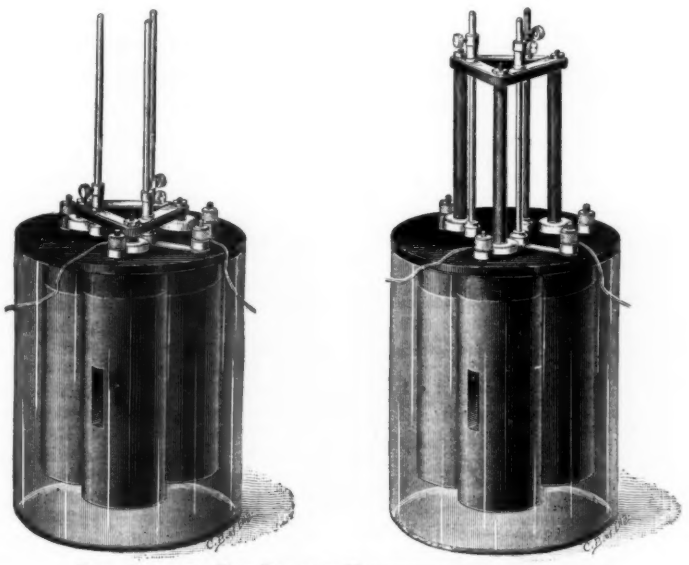
Stein is alleged to have compromised with the Second avenue street car line, of New York, and one or more lines at St. Louis and Chicago.

Ginsberg, it is claimed, was associated with him in some of these deals, and at Quincy, Ill., they enlisted the co-operation of Yetta Bachak, who is claimed to be Ginsberg's wife. When they called on the general manager yesterday for a compromise of the claim on a basis of $800 police laid hands on the trio and locked them up.

The New England Telephone and Telegraph Company has announced another reduction in their measured service rates dating back to May 1. The reduction for metallic circuit and long-distance wall equipment is from $102 to $90 for 800 calls and from $134 to $ 20 for 1,400 calls. The additional call charge is at the rate of eight cents and five cents, respectively, in these two classes, but the list is now extended so that for $174 one is entitled to 3,000 calls and three cents for each additional call. The rates for two-party line are reduced in the 800 call class from $84 to $72 and proportionately throughout.

The Boynton Multivolt Battery.

An interesting type of primary battery is made by the Multivolt Battery Company, of 10-14 Whipple street, Brooklyn. Through the courtesy of the inventor, whose name appears in the title, a representative of the ELECTRICAL REVIEW was permitted to witness several practical tests of its output. A single cylindrical containing jar of glass is used, in which is supported on a hard rubber cover three carbon cups closed at the bottoms. Three stick zincs of the size commonly employed in Leclanché batteries are secured to an insulated frame triangular in shape, and may be raised out of or depressed into the carbon cups, after the fashion of a Grenet dip battery. A single fluid is employed, such as *electropoion* (a mixture of water, sulphuric acid and a bichromate of an alkali, such as soda or potash). The carbon cups are coated on the outside with rubber, which is vulcanized *in situ* and forms a firmly adherent insulating jacket. In order to permit circulation of the fluid, the carbon cups are perforated on the remote sides, as indicated in the accompanying engravings, a vertical row of holes about three-sixteenths of an inch in diameter being employed in the type shown, instead of the slot seen in the engraving herewith presented. Three binding posts are mounted on the cover.



FIGS. 1 AND 2.—THE BOYNTON MULTIVOLT PRIMARY BATTERY.

With this organization the voltage of one, two or three cells may be taken, as desired, the maximum of the three cells being five and one-half volts. The output of one jar eight inches high by six inches in diameter (three cells) is five and one-half volts and five amperes. By reason of the large volume of depolarizing liquid—the jar being filled to within an inch of the top—and the facility afforded by the holes for circulation, the battery has good lasting power; it is said it will drive a fan motor or light a low voltage lamp—both good tests of sustained work—for over 13 hours with a single charge of solution.

The structural features of the battery deserve commendation as contributing to cleanliness and reliable contacts. An annular flange of lead is cast around the top of the carbons, thus preventing the acid solution attacking the brass connections. Moreover, the facility of withdrawing from the containing jar the entire mechanical outfit permits the solution when spent to be easily disposed of, and a fresh charge made.

In the matter of multiplying voltage in a single jar, several of our contemporaries in noticing this battery have fallen into error. The familar "Trouve" cell develops four volts from a single containing jar, no partition being employed to separate the two pairs of elements.

The attention of the ELECTRICAL REVIEW representative was called by Mr. Boynton to a curious fact that the arrangement of the holes has an important bearing on the behavior of the battery. A test of the following organization was made: A hard rubber case divided into six cells by rubber cross partitions was provided with six couples of zinc and carbon, one pair to each cell. Coupled in series, each cell had a few holes bored in the outside, and the whole was immersed in *electropoion;* but five volts instead of 12 was indicated by the voltmeter. Whether, with holes of the cross-section employed, the voltage limit was reached is an interesting question.

Doubtless there would always be more or less leakage of current through the main body of the fluid outside of the cells, varying in amount with the cross-section or electrolytic conductivity of the fluid in the holes. When the electro-motive force attained five volts it is possible the path was sufficiently free in that particular organization to prevent further rise of electro-motive force. Query: Would a reduction of cross-sectional area be accompanied by a proportional increase of electro-motive force until the maximum of 12 volts was attained, and still admit freedom of fluid circulation? An increase of wall thickness might also contribute to such a result.

As the result of improvements lately made at the electric light station in Brockport, N. Y., insurance rates have been reduced from $5.25 per $1,000 to $1.35.

PERSONAL.

W. H. Losie, of Syracuse, has been chosen a director of the Clyde, N. Y., Electric Company, to fill the vacancy caused by the death of the late Calvin McIntyre.

Mr. F. S. Palmer, of the Electric Heat Alarm Company, Boston, was among the visitors to New York last week and made a welcome call at the ELECTRICAL REVIEW office.

Mr. M. D. Law, electrical engineer of the Love Electric Traction Company, Washington, D. C., visited the metropolis last week. Mr. Law reports that the conduit line in Washington is working finely.

Mr. Walton Smith, of Tonawanda, N. Y., secretary of the Eastern Electrical Manufacturing Company, was a New York visitor last week. Mr. Smith is a well-known member of the electrical fraternity and has hosts of friends in the telephone field.

Mr. George W. Russell, Jr., president and general manager of the Russell & Officer Electric Construction Company, of Denver, Colo., will be in New York city until June 1. Mr. Russell is placing agencies for a new push button switch manufactured by his company and during his stay in New York will occupy an office at 13 Park Row.

Mr. Albert L. Clough, general manager of the Brodie Electric Company, of Manchester, N. H., was a New York visitor last week and paid the ELECTRICAL REVIEW an agreeable call. His vigorous company is meeting with fine success in the electrical field and business is constantly improving. The Brodie company is officered by able men and is meeting with well-deserved and extensive patronage.

Mr. Benjamin Norton has resigned the presidency of the Atlantic Avenue Railroad Company, of Brooklyn, N. Y., to take effect June 1. His personal affairs demand attention for the next several months and after that he may return to the steam railroad business, in which he was educated. Mr. Norton is a Pennsylvanian, 40 years old and a graduate of Williams College. He studied law with Smith M. Weed. He began his railroad career as an employé of the Manhattan Beach Railroad Company. In 1881 he became connected with the Long Island Railroad Company, of which he was elected vice-president. Two years ago he was chosen president of the Atlantic Avenue Railroad Company. Mr. H. M. Littell, of the New Orleans Traction Company, will become general manager of the Atlantic Avenue company on July 1.

The comparative earnings of the Edison Electric Illuminating Company of New York for April were as follows:

	1895.	1894.	Increase.
Gross	$129,277.27	$116,210.72	$13,066.55
Net	68,401.75	66,249.70	2,152.05
Income from Manhattan & Harlem Companies	3,802.32		
	$72,204.07		
FOUR MONTHS.			
Gross	$570,225.49	$488,058.40	$82,167.09
Net	302,271.89	276,275.55	25,996.34
Income from Manhattan & Harlem Companies	2,044.64		
	22,044.64		
	$324,316 53		

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SPECIAL NOTICE TO ADVERTISERS.

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue. **NEW ADVERTISEMENTS** should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, MAY 22, 1895.

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AGAIN BANQUO BERLINER.

This time the Bell company rejoices. The United States Circuit Court of Appeals has reversed Judge Carpenter's decision which declared the Berliner patent void. Thus again does this ghost that will not down menace the new telephone interests, and brings with it a possibility of 13 years of fruitful existence before its legal wake can be attended by rejoicing enemies and sorrowing friends. The serious effect of this reversal will depend on the extent the new companies in the field have builded on the permanent cancellation of the patent as announced by Judge Carpenter. It is announced that the case will be promptly appealed to the United States Supreme Court.

At the time the Bate refrigerator case was decided the ELECTRICAL REVIEW called attention to one point that was not included in the decision that might have an important bearing on this case. We find it considered in the following editorial from the New York *Times* of May 19, which ably covers the point:

We do not understand that the effect of the decision of the Supreme Court in the Bate refrigerator case upon the Berliner patent is definitely settled. That decision did put an end to the life of the three (Edison) microphone patents which were issued to the company in 1892, after a delay of more than 15 years. Those patents had been issued in foreign countries and had run their course there. We do not know whether a patent identical with the Berliner patent was issued years ago in a foreign country upon the application of Berliner, but we understand that patents covering the same invention were issued abroad to other American applicants in 1877 or 1878. These foreign patents have run their course and expired. If it shall be shown that they covered an invention practically identical with that which is covered by the Berliner patent here, then, in the opinion of well-informed persons, the law, as established by the Bate decision, deprives this Berliner patent of all force and lays it on the shelf with the Edison microphone patents of 1892. If the Berliner patent is dead, by the terms of the decision in the Bate case, the field is as clear now to the competing companies as it was last week.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

Wall street enjoyed another week of prosperity. There was less London buying than during the preceding week, and much more domestic interest in the market. Prices closed on the average considerably higher, and there was a more confident feeling that the advance has come to stay. About midweek there was a reaction in profit-taking. The recovery was speedy. There was little or no attempt at bear activity. The railroad shares, and particularly the grangers, were leaders. Trade reports are quite generally favorable, reflecting a further expansion of business and rising prices. Important advances in wages in the iron and steel trade are regarded as a very important indication that the improvement has come to stay.

The stock of the General Electric Company did not participate in the general bull movement. There were indications that it was purposely depressed. The prices ranged from 33¾ to 34½. There was some demand for the debenture 5's at 91½ to 92.

There were a number of rumors afloat regarding the company. The annual meeting was held at Schenectady on the 14th inst. The only business transacted was the election of a board of directors. As was foreshadowed by me last week, Messrs. D. O. Mills and H. McK. Twombley resigned. They were succeeded by Geo. B. Gardner and Thos. J. Cummins, Jr., both of Boston. Mr. Cummins, it is understood, will fill the place only temporarily, and at the proper time will make way for a prominent capitalist, whose name I am not at liberty to publish.

I asked one of the officers of the company regarding the rumors that a move from Schenectady to Buffalo was contemplated. He said that a suggestion of a very general character had been made to that effect. Buffalo had many advantages over Schenectady as a manufacturing and shipping point. However, it could be taken as final that the move would not be made unless a bonus sufficient to cover all expenses was offered. He said that the Niagara Falls power would not be a factor

I learn that during the year some 200 patents have been taken out by General Electric. These appear in the patent and franchise item of the financial statement and are believed to offset the depreciation caused by the adverse court decisions affecting the incandescent lamp, feeder and main and other patents.

Boston had a rumor to the effect that there were some indications that Western Union had been buying Erie Telephone. The latter company has important lines in the Southeast and Northwest, where Western Union has extensive interests.

Edison Electric Illuminating of New York was not traded in this week. The bonds are higher at 108 to 108½. The company makes an excellent statement of earnings for April and four months.

On the Boston Exchange, Bell Telephone had another sharp advance this week and other telephone stocks moved in sympathy. The opening quotations were 194 and 195, the closing 197 and 198. The price has reached the level maintained before the Bate decision. Erie advanced 1½ to 58; New England, 1 to 70; Westinghouse was steady at 33½ to 34½ for the common and 52 to 52½ for the preferred. BAIN.

New York, May 18, 1895.

On Monday American Bell opened on the Boston Stock Exchange at 208, sold to 210 and reacted to 202½. At 12 o'clock the stock was selling low and the closing price was 203 bid, 204 asked.

AMERICAN STREET RAILWAY ASSOCIATION.

MEETING OF THE EXECUTIVE COMMITTEE IN NEW YORK—A FOUR-DAY CONVENTION AT MONTREAL, BEGINNING TUESDAY, OCTOBER 15, 1895.

A special meeting of the executive committee of the American Street Railway Association was held at the Waldorf Hotel in this city, Wednesday of last week, and was attended by every member with the exception of Vice-President Russell B. Harrison. President Joel Hurt, of Atlanta, presided, and Col. John N. Partridge, of Brooklyn, was elected secretary *pro tem*, to fill the vacancy caused by the death of Secretary William J. Richardson.

It was decided to hold a four-day session at the next convention, to be held at Montreal, beginning Tuesday, October 15, 1895. It is probable that a special train will carry delegates from New York city and the East at a round trip rate of one fare and a third.

Mr. G. C. Cuningham, of Montreal, assured the committee of a warm welcome from the hospitable people of his city.

OUR BOSTON LETTER.

The project of establishing a municipal lighting plant at Arlington, Mass., has been defeated at the polls at a special town meeting, and the matter will probably not be brought up again for at least two years. The result of the vote was unsatisfactory in some respects to both parties, as showing very little interest in the matter either for or against, by the majority of the towns-people. The total vote of the town is something over 1,300, but only 430 votes were cast, of which 231 were in favor of a municipal plant and 196 against it. As a two-thirds vote was necessary, the measure was lost.

The Commonwealth Avenue Street Railway Company will begin work on the construction of its line through the Newtons within a few weeks. It will be double track, and will be laid in the reserved grass space between the roadways of the new Boulevard. If the West End road extend their tracks from the Reservoir to the Newton line, as they contemplate doing, it will make a continuous run of 13 miles from the city proper to Riverside on the Charles River, and one of the prettiest routes in the country.

The Lynn Foundry and Manufacturing Company, of this city, have recently closed some very important contracts for electrical overhead construction, among them being the Georgetown & Tennallytown Electric Railway, which calls for about eight miles of equipment. The Buffalo & Niagara Falls Electric Railway, comprising 31 miles of cap and cone construction; and last but not least, the Nantasket Beach branch of the Consolidated, which will be operated by electricity this Summer. This is one of the first steam roads to be electrically equipped. Considerable attention is being given to the details of construction, and some novelties have been introduced in the overhead work which it is expected will prove of considerable value. In the first place the feed wires will be of bare copper $\frac{13}{16}$ of an inch in diameter, and will pass through specially constructed insulators on the top of the poles. The trolley wire is also of special construction, and will be supported in a novel manner, doing away with the breaks incidental to the present mode of support, and offering a smooth and continuous surface to the trolley wheel. The cross wires will run directly through the poles, and be fitted with special ratchets for keeping them always taut. Another feature is that the overhead frogs, such as are now used for switching, will be entirely done away with and a special mechanism adopted similar to that in track construction, and which is operated simultaneously with the track switch. This will give the trolley an uninterrupted surface to travel over and allow switches to be taken at a high speed without danger of wrecking the overhead work. This special work will all be furnished by the Lynn Foundry and Manufacturing Company, and in their opinion the problem of overhead construction for electric roads is considerably nearer a satisfactory solution.

Since the electric mail service has been put into successful operation in Boston, the authorities in Portland, Me., are contemplating the establishment of a similar service in that city, and Postal Inspector Merritt is now looking over the ground preparatory to sending in a report to the department. From the fact that the electric railways of Portland will afford rapid communication between at least 13 outlying post offices, it is expected that his report will be favorable, and if so, Postmaster-General Wilson will take immediate action. The offices which can readily be supplied at present are those at Woodsford, Deering Centre, Morrill's Corner, East Deering, Cumberland Mills, Saccarappa, Stroudwater, Cape Elizabeth, Willard, Knightville, South Portland, Pleasantdale and a new station which it is proposed to locate at some point near the Union station. The advantages to be obtained by the electrical transportation of mail matter have already been fully demonstrated, and it now seems only a matter of a short time before this system will be very generally adopted, wherever the conditions are favorable.

The amendment which has just been added to the subway act, giving the commissioners authority to depart from the strict letter of the law in one or two instances where it was demonstrated to be necessary, is a very sensible one, and fortunately met with little or no opposition in the House. The provisions of the amendment merely allow them to take a little more space under the Common where stations are to be located, in order to widen platforms and better facilities for handling the crowds in safety. The only point to be raised against it was that a few extra trees would have to be sacrificed, but this being purely a matter of sentiment as against the additional safety of the 100,000 people who will daily use these platforms, the request of the subway commissioners was a very reasonable one. The amended bill has been ordered to a third reading, and all opposition to the subway is practically at an end. H. G. T.

Boston, May 18.

BERLINER PATENT UPHELD!

The United States Circuit Court of Appeals Reverses Judge Carpenter's Decision in the Famous Transmitter Case.

CONSIDERED A GREAT VICTORY FOR THE BELL COMPANY—APPEAL TO BE PROMPTLY TAKEN TO THE UNITED STATES SUPREME COURT.

The Brief Order Handed Down in Boston Suddenly—Reasons for the Decision to Follow in June.

MUCH EXCITEMENT CREATED IN TELEPHONE CIRCLES AND MUCH SPECULATION AS TO THE EFFECT OF THE REVERSAL.

THE BERLINER PATENT IN FULL.

On Saturday, May 18, at Boston, the United States Circuit Court of Appeals, Justices Colt, Putnam and Nelson sitting, in the case of the American Bell Telephone Company and others, appellants, against the United States of America, appellee, sent down this order:

The decision of the Circuit Court is reversed, and the case is remanded to that court with directions to dismiss the bill. Ordered, that the appellees have leave to file their motion as to the form of judgment now on clerk's list and also brief in support of the same on or before the 25th inst. The appellants to file brief in reply on or before the 31st inst.

The full opinion of the court giving the reasons for the decision has not yet been written. It will be given out, it is expected, June 10.

The Berliner transmitter patent is familiar to most of our telephone readers. It is No. 463,569 and was issued to Emile Berliner November 17, 1891, having been applied for June 4, 1877. It is owned by the American Bell Telephone Company, of Boston, which, through its licensees, owns or controls nearly all the telephone exchanges in the United States, and also owns the great long-distance telephone system connecting the leading cities from Chicago to the Atlantic seaboard.

Suit in this case was brought by the United States Government against the American Bell Telephone Company to have the patent declared void, claiming there was illegal delay in its issuance, and that Berliner's prior patent, granted in 1880, was for the same invention. The government claimed that the Bell company intentionally delayed the prosecution of the Berliner application and the issue of the Berliner patent for the purpose and with the result of prolonging its control of the art of telephoning beyond the expiration of the Bell receiver patents in 1893, and that it did this by submitting to delays on the part of the officers of the Patent Office, which delays the Bell company had it in its power to prevent and refrained from preventing for an unlawful purpose. This conduct was alleged to have constituted a fraud practiced on the public through the Commissioner of Patents and his assistants. It was claimed that the patents so obtained may and should be annulled by the decree of the court.

The decision of Judge Carpenter sustained the two grounds of attack made by the government against the patent and held that it was void and should be delivered up to be canceled. This opinion appeared in full in the ELECTRICAL REVIEW December 26, 1894.

The counsel were among the most eminent in the country. Hon. Causten Browne, of Boston, and Judge Robert S. Taylor, of Indiana, acted for the government, and W. G. Russell, J. J. Storrow, F. P. Fish and C. H. Swan for the Bell company. The case was argued before Judge Carpenter for six days in June, 1894, and for four days ending April 19 last, before the Circuit Court of Appeals.

The government had on file a motion to amend the bill, and to allege that in addition to the illegal delay in the prosecution of its application for a patent the Bell company had a tacit understanding with the officials of the Patent Office not to issue the Berliner patent pending the determination of the suits then pending over the Drawbaugh patent, which latter patent was claimed to be an interference.

It is in view of this motion to amend that the Court of Appeals gives the government leave to file its motion as to the form of judgment in this particular case. It is given until May 25 to file its brief as to the form the judgment should take, while the Bell company is given until May 31 to file its brief upon the same subject.

The opinion of the court will probably not be ready until about June 10.

Frederick P. Fish, counsel for the American Bell Telephone Company, said:

Yes, the decision is a big victory for the Bell. Really, I can't say anything about it yet. You understand the text of the decision is not yet known. It will not be until June 10 that we can see it. The bare decision is all we have so far. No one but the court knows as yet what the grounds of the decision are. Until they are known there is nothing to say on the matter.

A decision just now came as a great surprise to everybody. It was not expected for a long time yet. The three Judges, Messrs. Colt, Putnam, and Nelson, are said to have been in consultation as late as Friday upon the case. It was known that it would take a long time to write the opinion of the court. It is surmised that the reason the decision of the court was rendered so unexpectedly was to prevent a premature knowledge of the decision getting out. As is usual in important cases, the decision of the court is written out at length and printed, and it has not been customary to make the decision known until the opinion is printed.

Lawyer Causten Browne, counsel for the United States in the case, said: "All I have to say is that the case will be carried to the Supreme Court of the United States."

The decision has caused much rejoicing in Bell telephone circles, and corresponding dejection in the ranks of the opposition. It is generally

admitted that for extensive telephone exchange work battery transmitters are essential, and just how many of the new companies possess non-infringing instruments of this kind future events will soon disclose. The Carpenter decision was a source of great strength to these new companies, and vigorous organizations have been springing up all over the country planning to install telephone exchanges. They usually have been met with favor by the community, for the Bell licensees suffer the fate of all representatives of a monopoly, as the telephone long has been, and are not generally popular locally. These new companies will now have an opportunity to show what they can furnish outside of the Berliner patent. Still if it is promptly appealed it is not likely the Bell company will proceed against alleged infringers in view of the decision of Judge Carpenter, until a final decision has been reached, which might be before the end of the present year. Those companies that were in the field before the Carpenter decision declared the Berliner patent void—such as the National Telephone Manufacturing Company, of Boston, the Western Telephone Construction Company, of Chicago, and others—will probably not be disturbed by this sudden turn in telephone affairs, but all those that have depended entirely on the supposed corpse-like condition of Berliner's transmitter patent will now need to be careful not to become liable to infringement.

THE BERLINER TELEPHONE PATENT.

We publish below the full text of the patent issued to Emile Berliner, November 17, 1891 and assigned to the American Bell Telephone Company, of Boston. The application was filed in the Patent Office June 4, 1877, having been there for a period of over 14 years. It is as follows:

Be it known that I, Emile Berliner, of Washington, in the District of Columbia, have invented a new and useful improvement in combined telegraph and telephone, of which the following is a specification.

My invention consists in a new and useful improvement in transmitters for electrically transmitting sound of any kind, of which the following is a specification:

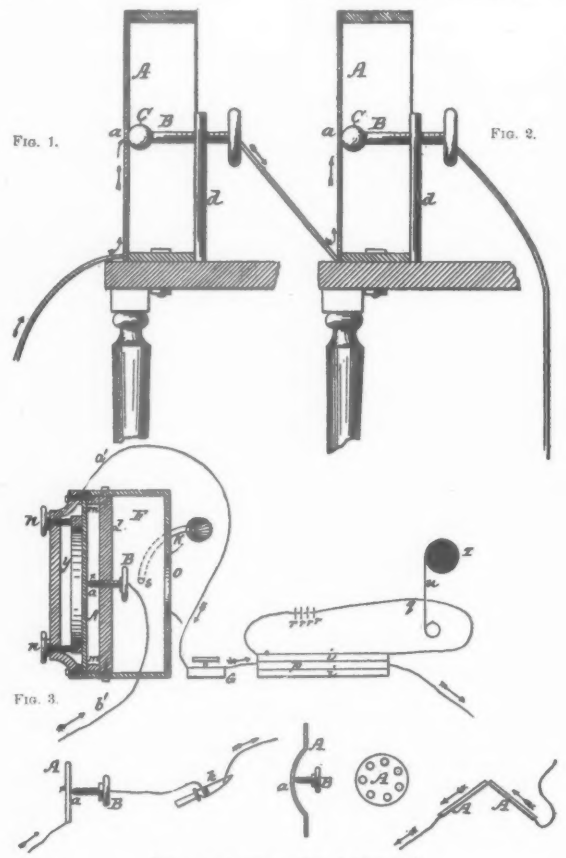
It is a fact that if at a point of contact between two conductors forming part of an electric circuit and carrying an electric current the pressure between both sides of the contact becomes weakened the current passing becomes less intense - as, for instance, if an operator on a Morse instrument does not press down the key with a certain firmness, the sounder at the receiving instrument works much weaker than if the full pressure of the hand had been used. Based on this fact I have constructed a simple apparatus for transmitting sound along a line of an electric current in the following manner.

In Figs. 1 and 2 of the drawings, A is a metal plate well fastened to the wooden box or frame, but able to vibrate if sound is uttered against it or in the neighborhood of said plate. Against the plate and touching it is the metal ball C, terminating the screw-threaded rod B, which is supported by the bar or stand *d*. The pressure of the ball C against the plate A can be regulated by turning the rod B. The said ball and plate are included in circuit with an electric battery, so that they form electrodes, the current passing from one of them to the other. By making the plate vibrate, the pressure at the point of contact *a* becomes weaker or stronger as often as vibrations occur, and the strength of the current is thereby varied accordingly, as already described. By placing now, as is shown in the drawings, one such instrument in the station Fig. 1, and another instrument capable of acting as a telephonic receiver in the station Fig. 2, both situated on the same electric circuit in which a current is passing (as shown by the wire connections following the arrows), sound uttered against the plate of the instrument Fig. 1 will be reproduced by the plate of the instrument Fig. 2, for as the vibrations of the transmitter Fig. 1, caused by the sound, will alternately weaken and strengthen the current as many times as vibrations occur, the diaphragm of the receiver will be caused by these electrical variations to vibrate at the same rate and measure. The latter vibrations being communicated to the surrounding air, the same kind of sound as uttered against the transmitter Fig. 1 will be reproduced at the receiver Fig. 2, or in as many other receiving instruments as are situated within the same electric circuit.

It is not essential that the plate should be of metal. It can be of any material able to vibrate, if only at the point of contact suitable arrangement is made so that the current passes through that point. The plate may be of any shape or size, or other suitable vibratory media may be used—a wire, for example. Any other metallic point, surface, wire, etc., may be substituted for the ball. There may be more than one point of contact to be affected by the same vibrations. Both of the electrodes may vibrate, although it is preferable that only one should. If the uttered sound is so strong that its vibrations will cause a breaking of the current at the point of contact in the transmitter, then the result at the receiving instrument will be a tone much louder, but not as distinct in regard to articulation.

I have also embodied my invention in and used it in connection with some other forms of apparatus.

In the drawings, Fig. 4 represents a detached view of the vibratory diaphragm, showing its relative situation to the poles of the galvanic current. Fig. 3 represents a view of a complete apparatus: Fig. 5, a view of the diaphragms arranged to receive and transmit the sound waves; and Figs. 6, 7 and 8, modifications of the vibratory diaphragm.



Figs. 4, 6, 7 and 8.—(Fig. 5 Omitted.)

Sectional View of the Berliner Telephone-Telegraph.

In the drawings the letter A represents a diaphragm or plate of thin metal of limited conductive capacity, such as iron, steel, german silver, platinum, secured in the frame *m m*, in the box F, in any convenient manner.

The letter *y* represents a ring resting against one side of said diaphragm and capable of being made to bear upon the same with more or less force by means of set-screws *n*, in order that the tension of the diaphragm may be regulated.

The letter B represents a screw or pin of metal, pointed at one end and mounted in a cross piece *d* in such position that the point will be in contact with diaphragm A. The diaphragm A is connected with one pole of a battery by means of a wire *a'*, and the pin or screw B with the other pole by means of a wire *b'*.

The box F of Fig. 3 is provided with a tube K, to which the ear of the operator may be applied, in order to hear the sounds produced by the vibratory diaphragm when the instrument is employed as a receiver, and a tube O, through which he can speak when employing the instrument as a transmitter, so that the operator is not in need of moving the instrument or moving his head while carrying on a conversation.

Instead of employing a single vibratory plate, as shown in Figs. 1, 2, 3, 4 and 5, in each instrument, two such plates may be employed, as illustrated in Fig. 8, said diaphragms being connected to the respective poles and in contact with each other at their edges, as shown in Fig. 8.

The diaphragm of my improved receiver, or the diaphragm of any magneto-receiver (such as those described by Alexander Graham Bell in his patent No. 174,465, of March 7, 1876, and in his patent No. 186,787, of January 30, 1877), will receive a particularly strong shock at the setting in and sudden cessation of the current, when a ticking sound will be heard from the plate; but a weakening of the current alone can also be observed most distinctly and accurately by making, for example, a connection within the same circuit by a wire and the blade of a knife *k*, Fig. 4. When scraping the wire end over the blade of the knife this scraping is distinctly audible on the plate. Here the current is never entirely interrupted, yet the minute elevations and cavities on the blade, caused by the structure of the steel, and which again cause minute alterations in the intensity of the current, are sufficient to shake or vibrate the plate with varying intensity, thus rendering again the same peculiar scraping noise. If, now, the plate of one instrument, as in Figs. 1 or 5, is vibrated by sound-waves (which happen whenever any kind of sound is uttered or is produced by musical instruments in its neighborhood), every wave or vibration that strikes the plate produces between the two sides of the contact a variation of pressure, which causes a variation of resistance at that point, and, therefore, a variation in the strength of the passing current, and if the sound is sufficiently strong it will break the circuit at said point of contact, the variations in the current thus produced causing similar vibrations in the plate of the receiving instrument. The essential part of the apparatus is the point of contact, which must offer a resistance to the current.

It is not necessary in the transmitting apparatus that the plate should be of conducting material, for any substance capable of vibration will answer, if only at the point of contact provision is made for the current to pass. It is sometimes convenient to use a vibrating plate in the form of a reflector, as shown in Fig. 6, for concentrating the sound, or the diaphragm may be provided with a number of apertures to disperse the sound, as shown in Fig. 7. These apertures prove advantageous with strong sounds, particularly the hissing sounds, as while the sound-waves are rushing toward the diaphragm, those touching the plate are repelled and partially destroy the following waves, just as sea-waves, when forced against a cliff, will be thrown back, destroying those directly behind. The holes permit most of the waves to pass to the other side of the plate, making the vibration of the plate more perfect and even.

I will here describe a recording apparatus, which, however, I do not claim.

In Fig. 3, G is a galvanometer, which is located in circuit with the contact-pieces or electrodes A B, and which serves as a convenient means for ascertaining the adjustment of the contact-pieces of the transmitter, so that a current shall pass. *i p i* is a Ruhmkorff coil or induction apparatus. When a current passes through the primary coil *p* and suddenly is broken, a spark will rush over between the ends of the secondary coil *i i* at *q*. This spark is accompanied by a peculiar sound due to the electric discharge, and if we bring between the ends of the secondary the connecting points *r. r, r, r,* a spark will occur between each of them, provided they are near enough to each other, and the peculiar sound will be heard between each of them. I now arrange a strip of chemically prepared paper or other substance *n*, to be drawn by clock-work T between the ends of this secondary wire at *q*. Said strip can be prepared in such a way that each spark will produce a mark upon it. If, therefore, the plate A vibrates by sound, each vibration causing a break of contact will produce a spark at *q*, and the strip being drawn through, a succession of marks will be produced upon the strip according to the number of vibrations caused by the sound; but at the same time the sound which was uttered at the plate A will be heard from the sparks rushing over the points *r, r, r, r* and *q*, because every spark produces one wave in the atmosphere in which it occurs, and a certain number of waves will, therefore, produce certain tones. Therefore, the same sound which is uttered against the plate A will be heard from the sparks. The scraping of the wire end on the knife-blade *k*, as in Fig. 4, in the primary current, will also be heard between the wire ends of the secondary current at *r, r, r, r* and *q*. This permits a number of designs for a receiving apparatus within the secondary current. For instance, initials, ornaments, etc., consisting of a number of metal pins, can be constructed in such a way that whenever a tone is produced against the plate A a spark will rush over said metal pins, and at the same time their sound is produced will render the design visible in illuminated characters.

By making the person of the operator a part of the secondary circuit and discharging the sparks in a body in the neighborhood of the ear the sound will be more particularly apparent

It will be observed that in Figs. 1 and 2 one of the electrodes presents a convex curvilinear surface like a rounded knob. This possesses some advantages, among which are ease of construction and durability, because it does not wear away the opposing electrode as much as a sharp one would, and when the contact with the vibrating body is made of such a form the freedom of the vibration is less interfered with.

I do not claim that I am the first inventor of the art of transmitting vocal and other sounds telegraphically by causing electrical undulations similar in form to the sound-waves accompanying said sounds. Neither do I claim that I am the first who caused such electrical undulations by varying the resistance of an electric circuit in which a current was passing.

I do not herein claim the novel form of vibratory-plate receiver which I have described, because that is a subject of claim in another application.

I claim:

1. The method of producing in a circuit electrical undulations similar in form to sound-waves by causing the sound-waves to vary the pressure between electrodes in constant contact, so as to strengthen and weaken the contact and thereby increase and diminish the resistance of the circuit, substantially as described.

2. An electric speaking telephone transmitter operated by sound waves and consisting of a plate sensitive to said sound-waves, electrodes in constant contact with each other and forming a part of a circuit which includes a battery or other source of electric energy and adapted to increase and decrease the resistance of the electric current by the variation in pressure between them, caused by the vibrational movement of said sensitive plate.

3. The combination with the diaphragm and vibratory electrode of a rigidly held opposing electrode in constant contact with the vibratory electrode, substantially as described.

4. In a telephonic transmitter, a vibrational plate made concave for condensing the sound, substantially as set forth.

5. In a telephonic transmitter, a vibrational plate provided with one or more apertures, as and for the purposes set forth.

6. A speaking telephone transmitter, comprising a diaphragm or disk sensitive to sound-waves, combined with a rigidly-held but adjustable electrode in contact with the same, whereby the electric current is transformed into a series of undulations corresponding with the vibrations of said diaphragm.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of the subscribing witnesses.

Witnesses: Emile Berliner.

J. A. Rutherford,
James L. Norris.

Electrical Mechanism for Opening and Closing the Van Buren Street Bridge, Chicago.

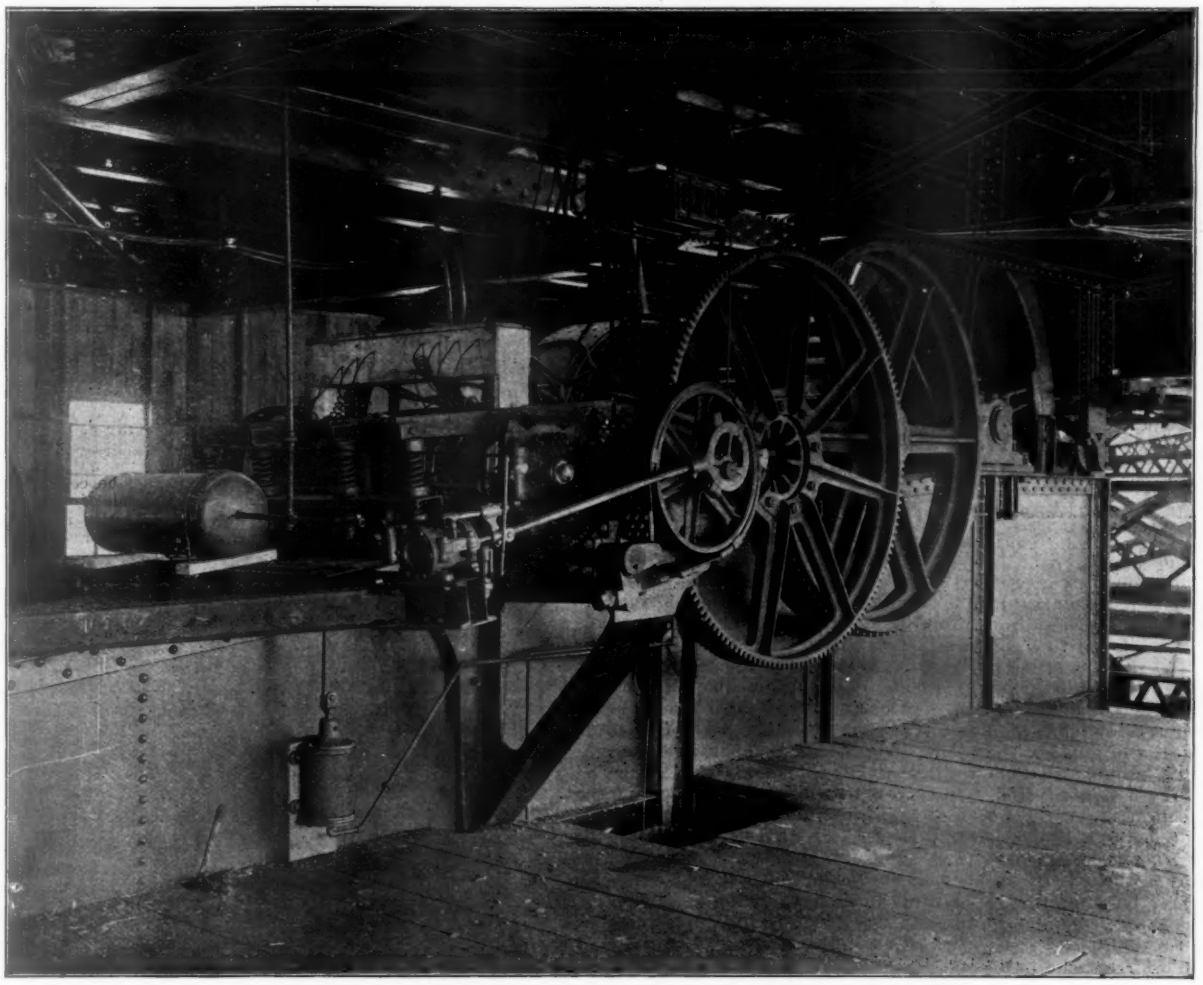
The Metropolitan West Side Elevated Railroad, of Chicago, has recently built, as a part of its system, a two-track bascule bridge across the Chicago river at Van Buren street. The bridge itself presents many interesting engineering features, but readers of the ELECTRICAL REVIEW will be more interested in the electrical mechanism, which is used to open and close the bridge draw. This is depicted in the accompanying illustration, for which we are indebted to the *Scientific American*.

The mechanism for opening and closing the bridge operates by means of a "working strut." This is a bar carrying on its rear portion a rack and running nearly horizontally back from the center of curvature of the circular segment of the bridge into the power houses. In the power houses are four 50 horse-power electric motors, operating a train of gear wheels, the last of which wheels engage with the racks. When a rack is drawn backward, the section of the bridge rises; when a rack is projected forward, the section descends. Within the backward extension of the roadway ballast is placed to bring the center of gravity into proper position. The effect of this is that the bridge naturally rests partly open and, if it is stirred from this position, tends to rock back and forth. The working struts are attached by pin connections to the central trusses; one strut operates each half of the bridge.

Assuming the bridge to be closed, if it is desired to open it, the machinery is started so as to draw the racks backward. As each rack moves, its first effect is to revolve a cam by which pin latches at the center of the span are withdrawn and the latches at the heels of the trusses are swung backward, leaving the trusses free to move. As the motion continues the bridge opens, 20 seconds sufficing for the entire operation. In closing, the reverse succession of operations takes place. The pin latches at the center are designed to prevent lateral movement and to insure the ends of the rails abutting in line; the other latches hold the trusses closed. Each truss may be treated as a cantilever, the tail girder representing the anchoring span.

The counterpoise weights are placed within the tail girders and between them, beneath the railway floor. As these weights are sufficient to prevent the bridge from naturally coming to a horizontal position, in the closing operation force has to be applied to bring the end down. To work each half of the draw span, two of the 50 horse-power electric motors are provided, which are wired to operate together or alone. If by any accident the current is cut off, compressed air brakes are automatically applied, which instantly bring the bridge to rest.

In the closing process, before the ends come together the sections are automatically brought to a full stop, so that the final closing has to be performed with special care. A powerful emergency brake is supplied to guard against accidents, which brake can be made instantly to act upon the structure. It is believed that all these precautions and structural features make an accident impossible. Owing to the height of the bridge, it will have to be raised for comparatively few vessels, as most can freely pass under it.



ELECTRICAL MECHANISM FOR OPERATING THE VAN BUREN STREET DRAWBRIDGE, CHICAGO.

General Electric Company's Annual Meeting.

The annual meeting of the stockholders of the General Electric Company was held in the company's offices at Schenectady, N. Y., on Tuesday, May 14. The attendance at the meeting was very light and no other business than the election of a board of directors was transacted. The board for the ensuing year consists of the following gentlemen: Gordon Abbott, Oliver Ames, 2d., C. A. Coffin, T. Jefferson Coolidge, Jr., C. H. Coster, Thomas A. Edison, Eugene Griffin, F. S. Hastings, H. L. Higginson, J. Pierpont Morgan, Robert Treat Paine, 2d., George F. Gardner and T. K. Cummins, Jr.

Messrs. Gardner and Cummins take the places of Messrs. Twombly and Mills on the board. It is reported that Mr. Gardner's election is permanent, while Mr. Cummins will soon retire in favor of some one else. A Wall street news agency, Dow, Jones & Company, last week said that the retirement of Mr. Twombly from the General Electric board is due to the efforts of the particular interest in the board which was directly responsible for the breaking off of negotiations with the Westinghouse company, which negotiations Mr. Twombly was foremost in bringing about.

The annual meeting was harmonious and quiet, about 220,000 shares of stock being voted. This is 10,000 shares more than were voted last year.

The present officers of the company will hold over until the election of their successors by the board of directors. It was reported just after the annual meeting that First Vice-President Eugene Griffin is to retire from the company to manage a business concern in New York city.

OBITUARY.

Miss Julia Phelps, sister of the late George M. Phelps, of Brooklyn, N. Y., on May 14 jumped from a third-story window of her house and was instantly killed. Miss Phelps was suffering from dementia, brought on by the recent deaths of her mother, sister-in-law and brother. She had been in charge of a trained nurse, but on this occasion managed to elude her.

La Crosse, Wis., will soon begin work on a new telephone exchange, the construction of which will be under the direction and supervision of Paul W. Bossart.

The First Insulated Submarine Cable.

A press dispatch about the middle of March informed the world that Captain Jack Sleeth, an old river pilot, had died at Paducah, Ky. He claimed to be the inventor of the insulated submarine electric cable. He was interested in the Nashville and St. Louis line, and it was found exceedingly unsatisfactory to string the wires high enough above the water, even of smaller rivers, to prevent them from being knocked down by steamboats, and it was practically impossible to do so in the case of the Ohio. He hit upon the plan of a submarine cable for the line which crossed the Ohio at Paducah to Brooklyn, Ill. The cable was a very crude affair, the wire being simply wrapped in bagging, which was then tarred. The experiment worked very well and Professor Morse, hearing of it, sent for Captain Sleeth. The captain met him in New York and explained his cable. Parts of the original cable are kept by a few people in Paducah as souvenirs, and other parts are still at the bottom of the river. Captain Sleeth is said to have had papers in his possession which proved the truth of his assertions, one being the letter in which Professor Morse asked him to come on to New York and explain the workings of his line.

This dispatch moved several people to write to the daily papers relating what they knew of the matter. Mr. D. Huntington, of New York city, wrote as follows to the *Evening Post*:

In your paper of March 13, in an obituary notice of Capt. Jack Sleeth, of Paducah, Ky., it was said: "In 1845 he erected the first telegraph in this section from St. Louis to Nashville, and conceived the idea of burying the wire under the Ohio River. This was before the days of submarine cables." This conveys the impression that Captain Sleeth originated the idea of submarine cables. In September, 1837, in a letter to Hon. Levi Woodbury concerning construction of lines of telegraph, Professor Morse wrote: "Where the stream is wide and no bridge, the circuit enclosed in lead may be sunk to the bottom," and again, referring to stretching the lines upon posts, says: "This mode would be as cheap probably as any other, unless the laying of the circuit in the water should be found to be most eligible."

In October, 1842, Professor Morse, who had begun experiments several years before, constructed and on a moonlight night laid a cable between Castle Garden and Governor's Island, and transmitted signals, when the circuit was broken by the wire being caught by the anchor of a vessel setting sail, partly hauled up, and carried off by the astonished sailors. Professor Morse, as soon as he completed his first rudely constructed recording electric telegraph in the Winter and Spring of 1835–36, began to apply its principles to submarine telegraphy, and declared his perfect faith in its eventual complete success. I was a pupil under Professor Morse at that time, and witnessed his earliest experiments.

Then Mr. C. C. Hine, of 137 Broadway, New York city, wrote to the *Sun* on March 30, in part as follows:

My attention having been called to a clipping from last Sunday's *Sun* in regard to Capt. Jack Sleeth, of Paducah, Ky., as the inventor of the submarine cable, I venture to correct some of the statements therein, not for the purpose of robbing the gallant captain of any of his laurels, but for the sake of accuracy in the ancient history of telegraphy in America. Your article speaks of the practical impossibility of taking a wire over the Ohio on masts, but this had been done some time before any telegraph wire ever reached Paducah. There are plenty of men still living who remember the masts at Jeffersonville and Louisville, on which the wire fromCincinnati went over. I myself saw those masts as late as 1850, at which date, and for three years before, the broader Mississippi was bridged by a wire strung from a mast on the Illinois shore to a shot tower in St. Louis. At page 223 of J. D. Reid's "Telegraph in America" specific mention is made of this aerial crossing, as well as of the first futile attempts to cross by cable. I was at that time an operator in the St. Louis office, and was not only personally cognizant of the facts, but assisted in laying the first cables across the Mississippi in 1849. For details reference is made to the above citation and Mr. Reid's book, at page 234, where mention is made of river crossings by masts over the Mississippi at Hannibal, Keokuk, Rock Island and Dubuque, and over the Illinois River at Beardstown and Peoria.

In 1886 I read a paper before the Old Time Telegraphers which gives a detailed account of this early cable laying. That paper is among the archives of that association, and is also printed in full on pages 466–470 of the *Insurance Monitor* for that year. I think the St. Louis cable laying antedated any experiment that could have been made at Paducah, because the first (and for a year or two the only) telegraph line running South from the West was that of the Southwestern Telegraph Company, from Louisville *via* Lexington to Nashville and on to New Orleans. This line was built in the Summer of 1848, and it is not probable that any wire reached Paducah until some time later; it was certainly in 1850 that Col. Tal. P. Shaffner got his line completed to St. Louis from Nashville. I am therefore of the opinion that the superintendent of the Ohio and Mississippi line, J. N. Alvord, was ahead of Captain Sleeth in his submarine experiments, and even Alvord must have followed others, for the wire which he procured from the East was covered with three coatings of gutta percha expressly for submarine use, and was not made to order, but was at that time more or less a standard article, and it seems highly improbable that Professor Morse was ignorant of this at the time it is alleged he invited Captain Sleeth to come from Paducah to New York to explain his bagging-covered, tarred wire cable.

There were in the infancy of practical telegraphy a good many things "invented" by different men, widely separated, who were confronted with the same difficulties, and I do not wish to detract a single jot from the honors of Captain Sleeth, but I am convinced that his recent biographer was not in possession of all the facts concerning the early river cables in the West.

Westinghouse News.

The time of holding the annual meeting of the Westinghouse Electric and Manufacturing Company has been adjourned to July 17.

LITERARY.

McClure's Magazine for June will contain excellent short stories by Rudyard Kipling, Robert Barr and Stanley J. Weyman.

Rich with crisp articles of local and national interest, with bright fiction and piquant criticism on contemporary literature and art is the number of *Once a Week* for May 16. Prominent among the contributors are a breezy account, profusely illustrated, of the labors of "The United States Fish Commission;" the first of two papers on the oppression of labor on the East Side in New York city, entitled "In Sweater Land," with pictures of "sweaters" and their victims; and the 14th instalment of "American Comic Journalism," by Mr. T. B. Connery.

"The Mechanical Engineers' Pocket-Book. A Reference Book of Rules, Tables, Data and Formulas for the Use of Engineers, Mechanics and Students," by William Kent, A.M., M.E. 1,087 pages; 168 illustrations; 12mo.; morocco flap. Price, $5. Sent postage free on receipt of price by the ELECTRICAL REVIEW Publishing Company, 13 Park Row, N. Y.

This is a very desirable and handy pocket-book, both for the mechanical and electrical engineer whose professions have so much in common. Considerable space is devoted to electrical subjects in the present work, and the matter seems to have been selected with intelligence and care. We quote from the preface as follows:

More than 20 years ago the author began to follow the advice given by Nystrom: "Every engineer should make his own pocket-book, as he proceeds in study and practice, to suit his particular business." The manuscript pocket-book thus begun, however, soon gave place to more modern means for the disposing of the accumulation of engineering facts and figures, viz., the index rerum, the scrap book, the collection of indexed envelopes, portfolios and boxes, the card catalogue, etc. Three years ago, at the request of the publishers, the labor was begun of selecting from this accumulated mass such matter as pertained to mechanical engineering, and of condensing, digesting, and arranging it in form for publication. In addition to this, a careful examination was made of the transactions of engineering societies, and of the most important recent works on mechanical engineering, in order to fill gaps that might be left in the original collection, and insure that no important facts had been overlooked. In the first place it was considered that the field of mechanical engineering was so great, and the literature of the subject so vast, that as little space as possible should be given to subjects which especially belong to civil engineering. Another idea prominently kept in view by the author has been that he would not assume the position of an "authority" in giving rules and formulas for designing, but only that of compiler, giving not only the name of the originator of the rule, where it was known, but also the volume and page from which it was taken, so that its derivation may be traced when desired. When different formulas for the same problem have been found they have been given in contrast, and in many cases examples have been calculated by each to show the difference between them. Much attention has been paid to the abstracting of data of experiments from recent periodical literature, and numerous references to other data are given. In this respect the present work will be found to differ from other pocket-books.

The Work of the Cooper Union Night Schools.

The night schools of the Cooper Union have for 25 years furnished to the men and women of New York city who are unable, through lack of means or time, to pursue a collegiate course elsewhere, an apportunity to acquire a mathematical and scientific education such as would fit them to find employment in engineering, architectural or other professional work.

Thousands of earnest men and women have availed themselves of the opportunity thus offered, while pursuing their regular avocations and earning their livelihood, to fit themselves for a higher sphere of usefulness; and many of the graduates of this school have taken high rank in the engineering profession and are today filling responsible positions because of the help they obtained in the Cooper Union classes.

Generous as was Peter Cooper's gift to the working people of New York, and useful as is the work accomplished, more might be done with larger funds.

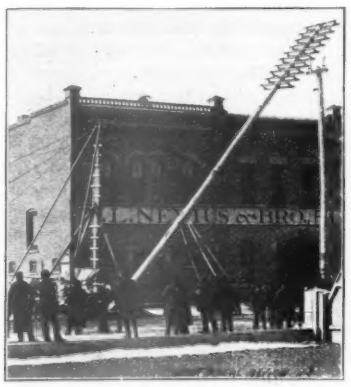
The advance of science and the useful arts, especially in the domain of physics and electricity, has been so rapid that it has been impossible to keep the facilities for instruction abreast of the times, and the usefulness of the school could be greatly enlarged by an addition to its collection of apparatus. Especially is this true in the electrical department. There is an entire lack in the collection of all apparatus for electrical measurements, motors and anything in fact to represent the electrical progress of the last 40 years.

There is a demand to-day for instruction in physical and electrical science that did not exist 20, or even 10, or five, years ago. The Cooper Union night school can do something to meet that demand, but the collections of apparatus should be brought up to date to enable it to do all that is needed. Those collections were once excellent for the work demanded. The fund left by Peter Cooper is doing all it can, but the work of the Cooper Union has grown to such an extent that it is impossible for it to do all that is needed. Is there not some one interested in promoting the welfare of the seekers for scientific knowledge who will help the cause by assisting to provide modern apparatus and appliances for instruction?

MODERN TELEPHONE POLE CONSTRUCTION.

METHOD OF RAISING A "JENNEY" POLE AT WINONA, MINN.

The new telephone exchange at Winona, Minn., is in full operation with 275 subscribers. The Hunnings form of transmitter, as made by the Western Telephone Construction Company, of Chicago, is used in connection with this company's switchboard and other apparatus. According to a correspondent, the local Bell company has made and is making a vigorous effort to hold the telephone business of Winona, having reduced its rates to $12 and $9 per year for business and residence telephones, respectively. In spite of these very low rates, the new company is getting the business without any reductions from its original prices of $30 and $18 per year. The new company's instruments are reported to be working excellently and giving



RAISING A "JENNEY" POLE AT WINONA, MINN.

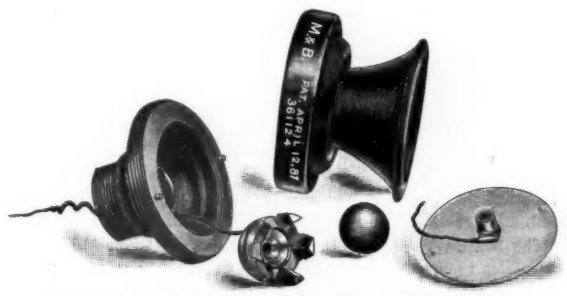
the best of service, which accounts largely for its success.

The Winona Telephone Company's poles and lines are of the very best material and have been installed in the most substantial manner by experienced men. The illustration on this page is from a photograph kindly furnished to the ELECTRICAL REVIEW by Mr. Paul W. Bossart, and shows the modern method adopted by the Winona Telephone Company in raising a "Jenney" pole. It will be noticed that a platform derrick, in which the stresses have been properly provided for, has been built on a wagon and hauled to the scene of operations. Stability for the derrick is afforded by pieces of heavy stone laid on the platform. The method of working is apparent from the illustration.

The *Picayune* hears complaint that some of the electric cars in New Orleans are furnished with seats upholstered with woollen material. The complaint is particularly made in view of the presence of smallpox in the city. Such upholstering, however handsome and otherwise comfortable, is liable to harbor germs of disease and for that reason is objectionable. The Japanese rattan matting, in use in some of the cars, is not subject to any such criticism, but, on the contrary, seems to be a desirable material. But bare boards would be preferable to any substance that can harbor disease.

The "M. & B." Telephone Transmitter.

The accompanying illustration of the "M. & B." transmitter gives a good idea of its construction. It will appear at a glance that it is neither Blake, Hunnings nor granular carbon (solid back), but is, in fact, not like any other ordinary type. It is claimed to be the most simple, perfect and reliable transmitter possible to con-



THE "M. & B." TELEPHONE TRANSMITTER DISMANTLED.

struct. The diaphragm is of India mica, a highly resonant material which gives great efficiency. Attached to the center of this diaphragm is a small aluminum cup holding a carbon or other suitable point. In front of the black rubber shell is shown the basket or runway of aluminum or other metal. The sphere shown in the cut may be of carbon or other material, eleven-sixteenths of an inch in diameter, which normally lies in the basket or runway, which is so constructed that no matter which side of the transmitter is up the sphere rests on a plane which is always inclined towards the diaphragm.

When these parts are assembled the point on the diaphragm comes about on a level with the center of the sphere, which, owing to the angle of the side of the basket or runway, is kept against this point by gravity. The distance between the point on the diaphragm and the back of the basket is about three-quarters of an inch, which allows the sphere a maximum movement of a little under one-sixteenth of an inch. With every oscillation of the diaphragm a movement of this sphere takes place which breaks the battery current, hence the name "make and break" and the well-known designation "M. & B." It will be readily seen by this description that the "M. & B." transmitter is novel in detail, and that the electrodes are not in constant contact, and that by it an intermittent or pulsatory current is produced instead of the undulating or vibratory, as is used by the ordinary form of transmitter. The "M. & B." principle is set forth in the first claim of the broad method patent No. 361,124, under which these transmitters are constructed. The claim reads:

Claim 1: The art or method of transmitting vocal or other sounds telephonically by causing intermittent or pulsatory currents of a uniform volume or intensity, and of durations corresponding to the phases of the oscillation of the diaphragm.

The practical results obtained by this form of transmitter, which show its advantages, are claimed to be:

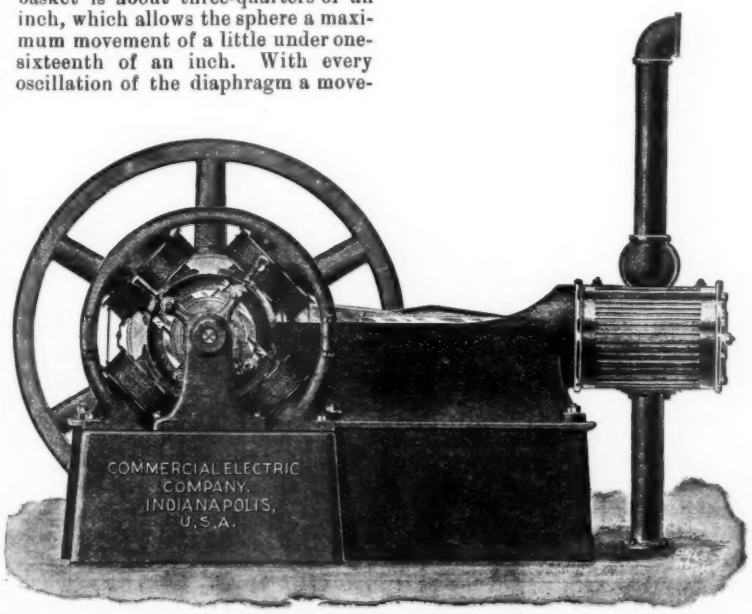
1. Articulation, which is claimed to be better and more perfect. Every syllable, whether a shout or a whisper, is transmitted clearly and distinctly. There is no running together of words nor confusion of sound.

2. Volume—While the volume of sound is great, yet there is no sputtering, snapping or "frying" sound, which is so annoying in many transmitters.

3. Long-Distance Transmission—Every "M. & B." transmitter is a long-distance instrument. The "M. & B." transmitter will stand more battery without "breaking up" than any other form of transmitter.

4. Simplicity of Construction—Nothing could be more simple than the "M. & B." There is nothing to get out of order; no adjustments to be made; no springs to give out; no "packing" and no plastic material to change in density.

The United States Telephone Construction Company, Bullitt Building, Philadelphia, who control the "M. & B." transmitter, invite competitive tests as to all their points of superiority. These transmitters are covered by over 10 construction patents, with others pending, besides the broad method patent mentioned before and issued April 12, so that users of these instruments are believed to be entirely safe from suits on patent questions.



COMMERCIAL ELECTRIC COMPANY'S DIRECT-CONNECTED MULTIPOLAR GENERATOR.

The Commercial Electric Company's Direct-Connected Multipolar Generator.

Appreciating the demand of the public for a type of machine which would be direct connected to the engine shaft, thereby economizing the floor space, the Commercial Electric Company, of Indianapolis, Ind., have recently placed on the market a machine of this description. By reference to the illustration on this page, which shows a 40-kilowatt machine, it will be seen that the space occupied is very small. If a greater economy of floor space is desired, the connection can be made to an upright type of engine. Besides containing many excellent features of the Commercial company's belted multipolar machines, the armature of this type is mounted on sleeves, so that the core and commutator are securely held together and in alignment, thus making it possible to easily remove them from the engine shaft without necessitating trouble or loss of time. They are furnished with or without the out-board bearings, as may be desired, but the out-board bearing as shown is recommended, as it greatly reduces any tendency towards vibration in the engine shaft. All machines are compounded for two per cent loss, so as to maintain a constant voltage at terminals after an allowance of a slight drop in speed in the engine has been made. Carbon or copper gauze brushes are provided and terminal boards are arranged so that the mains may be carried either overhead or underground. At present the makers are prepared to furnish this type of generator in any of the standard sizes from 20 to 100 kilowatts capacity, and they are made in all the standard voltages, viz.: 125, 250, 500. The machine may be direct connected to any style of engine which may be desired by the customer, as the speeds are moderate, that of the 40-kilowatt being 300 revolutions per minute.

KIND WORDS.

"PUTS HIM IN TOUCH WITH ADVERTISERS."

TO THE EDITOR OF ELECTRICAL REVIEW:

I am much pleased with your attractive paper and find it not only very interesting and instructive, but quite as valuable in putting me in touch with advertisers of goods in my line. Yours very truly,

M. A. G.

South Royalton, Vt., May 17.

EFFECT OF A TWO-INCH ADVERTISEMENT 1t.

TO THE EDITOR OF ELECTRICAL REVIEW:

Please find enclosed New York draft for the amount of our advertisement for issue of May 1. We are, so far, well pleased with the results of this advertisement, having received several direct orders from this notice, some by telegraph. You may insert the same copy in your issue of May 29, and in a short time we will be ready to carry a larger space with you. Thanking you, we remain,

Yours truly,

The Berliner Telephone Company,

E. S. ENYART,

General Superintendent.

Lincoln, Ill., May 15.

ADVANCE INFORMATION.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

New Telephone and Telegraph Companies.

UTICA, N. Y.—The Central New York Telephone and Telegraph Company has made arrangements for improving its service between Utica and Syracuse by putting in a new copper metallic circuit.

ROCKVILLE, D. C.—The telephone line between Cedar Grove, this county, and Ridgeville, Frederick county, has been completed and opened for business.

PARIS, ME.—Walter P. Maxim is getting subscribers for a local telephone exchange between Norway and South Paris.

PLYMPTON, MASS.—A telephone line is being constructed from Middleboro to Silver Lake.

LANSING, MICH.—The business men of this place want a new telephone franchise. They propose to charge $1.50 and $2 a month, respectively, for residences and business houses, and expect 300 subscribers to start with.

DELHI, N. Y.—The question of a telephone exchange here is being agitated.

PORTLAND, ME.—The Casco Bay Telephone Company has been organized.

RUSSELLVILLE, ALA.—A new telephone line has just been completed from Tecumseh to Warrior.

LOVELAND, OHIO.—The Cincinnati Telephone Company is erecting poles for a line from Loveland to Montgomery. The office will be at the Hill House.

CATLETTSBURG, KY.—The People's Telephone Exchange, which was organized here some time ago, has most of its poles in place and will soon have the city connected by wire.

ST. CLOUD, MINN.—It is reported that the Northwestern Telephone Company is about to extend its line to Little Falls.

PLYMOUTH, MASS.—A new telephone line will soon be constructed from Plymouth through Carver and Plympton to Middleboro.

MONTPELIER, VT.—A telephone office has been established at South Strafford and is connected with Tunbridge and South Royalton.

AUGUSTA, ILL.—The Western Illinois Telephone Company has been incorporated. Capital stock, $5,000. To operate telephone lines. Incorporators, P. P. Newcomb, Moses Weinberg and Jacob W. Klepper.

CHICAGO, ILL.—St. Louis Telegraph News Company has been incorporated. Capital stock, $100,000. To gather and distribute news, and to construct, equip and maintain telegraph and telephone lines. Incorporators, Dwight F. Cameton, Hamilton S. Wicks and Joseph S. Young.

SHAMOKIN, PA.—The Anthracite Telephone Company has been incorporated. Capital, $10,000.

NORTHEAST, PA.—The Mutual Benefit Telephone Company has been incorporated. Capital, $1,000.

COLUMBIA, PA.—The Columbia Telephone Company has been incorporated. Capital, $5,000.

FORT VALLEY, GA.—The Fort Valley & Perry Telephone Company has been formed. The company will at once put in a line to Perry and the two places will be connected. The officers are C. W. Withoft, president; T. V. Fagan, vice-president; W. P. Harwell, general manager; George L. Keen, secretary and treasurer; H. C. Menten, general superintendent and inspector.

MILWAUKEE, WIS.—Messrs John Gillespie, Joseph Ruth, M. English, Dr. J. A. Palmer and George Littlefield have been granted a franchise to form a stock company to establish a telephone system at that place. It is the intention of the company to extend the system as far as the towns of Waumandee and Montana.

MANCHESTER, N. H.—The Union Electric Company have under consideration important additions to the power of their plant.

OSAGE, IA.—The Northwestern Telephone and Construction Company have begun work in this city erecting poles and wiring the place for a system of telephones. They are to connect with Charles City and Mason City, and lines will also be sent out from here to nearly every town in the county.

CROOKSTON, MINN.—Messrs. Edwin Plowman and E. M. Walsh, president and secretary of the Crookston Telephone Company, have secured right of way for the extension of their line to Grand Forks, *via* Fisher and Mallory.

GORHAM, N. H.—A telephone exchange is a possibility.

KANSAS CITY, MO.—The possibility of a telephone line from Clinton to Kansas City is talked of.

LYNN, MASS.—Foundations are going in for the new central of the New England Telephone and Telegraph exchange to be erected on Oxford street. The building will be constructed of brick and stone and will be equipped with the most improved switchboard. It is expected the building will be completed for occupancy some time in August.

OXFORD, PA.—There is talk of building a telephone system here during the Summer.

DETROIT, MICH.—McBain & Dunham will soon have a telephone line completed from Cadillac to Lake City, *via* Lucas and McBain. The instruments used will be what is known as the Chase telephone, made in Grand Rapids.

COLUMBIA, PA.—The Columbia Telephone Company was chartered by the State Department yesterday; capital, $5,000. Directors, Harry C. Young, Frank G. Paine, Blanton C. Welsh, Charles H. Rochow and H. F. Yergey, all of Columbia.

CINCINNATI, O.—The Anthony Telephone Company has been granted a franchise.

NEW BRITAIN, CONN.—The New Britain Telephone Company has been organized with a capital of $25,000. The subscribers are: R. L. Andrews, Richard Schrey, and numerous other residents of New Britain.

WARSAW, N. Y.—E. B. Munro, of Warsaw, has been granted a franchise to erect poles for a local telephone exchange.

LOUISVILLE, KY.—The Paris telephone system is to connect with Cynthiana, Richmond, Mt. Sterling, Georgetown and Millersburg.

WAREHAM, MASS.—A telephone is to be constructed from Buzzards Bay to Plymouth park, to accommodate the Boston cottagers at the latter point.

DETROIT, MINN.—A telephone company was incorporated here last week for putting in a telephone system between here and Lake Melissa. It is also the intention to extend the wire to Fargo, N. D. The company will be known as the Detroit Telephone Company. They elected officers as follows: President, T. A. Nottage; secretary, J. K. West; treasurer, J. E. Furbert.

BENSON, N. Y.—The building of a telephone line between this village and Putnam, N. Y., a distance of three and one-half miles, is very generally talked.

SAXONVILLE, MASS.—Work on extending the telephone line from this place to Wayland is nearly completed. Poles have been erected as far as Wayland and work on putting up the wires was commenced the first of this week.

HUNTSVILLE, ALA.—A new telephone line is to be built here.

ALLEN'S MILLS, ME.—The Franklin Telephone and Telegraph Company will establish a telephone line to Madison, *via* Allen's Mills and Starks and probably through West's Mills.

GALLATIN, MO.—A telephone service is to be established here.

SACRAMENTO, CAL.—The Sunset Telephone Company is about to greatly improve its service in this city.

SALEM, W. VA.—The telephone line from here to Mannington, built by Lune Law, is completed.

HAWKINSVILLE, GA.—A telephone exchange will be put in here before many days. Mr. Ed. Burch, postmaster and one of Hawkinsville's most enterprising citizens, is figuring on the plant.

Electric Light and Power.

SANTA FE, N. M.—Rio Grande Electric Power and Irrigation Company has been incorporated. Incorporators: A. H. Handlan, St. Louis, Mo; T. M. Murray, East St. Louis; Levi Ellis, New York, and J. H. Purdy and H. Claussen, Santa Fe. Principal place of business, Santa Fe.

DETROIT, MICH.—R. Gentle has established an electric light plant in the old Columbia Hotel building on Columbia street, west.

NEW ORLEANS, LA.—Algiers Ice and Electric Light Plant was sold at public auction.

READING, PA.—The Citizens' Electric Light, Heat and Power Company has been organized. Directors: John R. Bechtel, Charles N. Frame, Milton H. Schnader, L. V. Halberstadt and Henry C. England. Mr. Bechtel is president, Mr. Frame, secretary, and Mr. England, treasurer. Garrett B. Stevens, Esq., is solicitor and has already applied for a charter of incorporation. The capital stock is $100,000 divided into 100 shares.

INDEPENDENCE, MO.—The Citizens' Electric Light Company has been purchased by the Western Electric Light Company for $25,000.

TRUMANSBURG, N. Y.—The Board of Trustees of this village has contracted for 26 arc electric lights of 1,000 candlepower, at $1,200 per year, for street lighting purposes.

PITTSBURGH, PA.—A complete electric light plant to be put into the Hotel Anderson by McKinnie & Bean, the proprietors, at a cost of $25,000.

ST. CLOUD, MINN.—A number of St. Cloud people are considering the advisability of organizing a second electric light company. They propose to furnish light at a reduced cost. The company has not yet been organized.

UNION CITY, MICH.—The electric light plant, which has been operated by private parties, has passed into the hands of the town authorities. Its capacity has been doubled, and it will be operated in connection with the waterworks system.

MITCHELL, S. D.—The Mitchell Electric Light Company, whose plant is owned by St. Paul men, was sold yesterday to M. B. Cleminger, of this city, the price paid being $15,000. The company holds a 20-year franchise, and also has a contract for lighting the city at $140 per month for the same length of time.

CHENOA, ILL.—A franchise has been granted the Chenoa Electric Light and Power Company. The incorporators are: Noah H. Pike, W. H. Bennett and W. L. Miller.

ST. IGNACE, MICH.—J. F. Keightley has been granted a 30-year franchise for an electric light plant and telephone system at Mackinac Island. He expects to have everything in running order about June 1, 1896.

ELKINS, N. C.—Steps are being taken looking to the establishment of an electric light plant. H. G. Chatham may be addressed concerning same.

PALM BEACH, FLA.—Henry M Flagler will erect an electric light plant to light the Hotel Poinciana, and his new hotel to be built.

CLARE, MICH.—The new electric light system is now in active and successful operation.

HAGERSTOWN, MD.—The William Wharton, Jr., Company, of Philadelphia, represented by Powell Evans, has been granted privilege to erect an electric light plant on the canal of the Chesapeake and Ohio Canal Company. They propose to furnish the factories here and at Williamsport with 7,500 horse-power by electricity.

ALEXANDER CITY, ALA.—Steps are being taken to establish an electric plant.

MONTCLAIR, N. J.—The Montclair Light and Power Company had articles of incorporation recorded in the county clerk's office yesterday. The object of the company is to furnish electric light and power to the town of Montclair and its inhabitants. The capital stock is placed at $50,000, and the company will commence business with $10,000. The incorporators of the company are: Whiting G. Snow, Charles D. Backus, and William W. Ames, of Montclair, and Charles C. Poe and George F. Baker, of New York.

MONTPELIER, VT.—An electric light and power company is to be established here. J. S. Viles is interested.

PULASKI, N. Y.—The electric plant has been purchased by A. F. Betts.

MOOREHEAD, MINN.—The City Council has let the contract for building the new electric light and pumping station to P. H. Lamb, of this city. The contract for fitting the same with engines, etc., was let at the meeting of the council on May 15.

GRAND RAPIDS, N. D.—Mr. J. S. Richardson is negotiating with the business men of Crystal in regard to putting in an electric light plant.

VERMILLION, S. D.—Electric lights will be established here in the near future.

GLENWOOD, MINN.—Glenwood is to have electric lights. The council so decided at a recent meeting. The contract was let to J. R. Serrin, proprietor of the Glenwood Roller Mills.

SAGINAW, MICH.—J. F. Keightley has been granted a 30-year franchise for an electric light plant and telephone system at Mackinac Island. He expects to have everything in running order about June 1, 1895.

YOUNGSTOWN, OHIO.—The electric light plant to be managed by Druggist Henry Kaercher is now an assured project and its erection is already under way, and its completion ready for service is expected to be reached about the first of June.

KNOXVILLE, TENN.—Reps Jones, chairman Board of Public Works, will on May 23 invite bids for lighting the streets of this city with 200 or more electric lights of 2,000 candle-power each for the term of one or five years.

MANCHESTER, N. H.—The Union Electric Company will make important additions to the power of their plant. This

company possesses water privilege on the Piscataquog River in Goffstown, and proposes to improve it this present season by the erection of a heavy stone dam equipped with the Hunt turbine wheels, capable of developing 1,000 horse-power.

LEBANON, VT. -Steps are being taken to establish an electric light plant.

ARROYO, CAL. — Steps are being taken looking to the establishment of an electric light plant.

GERMANTOWN, PA.—Electric lights are to be erected on Seminole avenue, between Willow Grove and Highland avenues.

PITTSBURGH, PA.—The Greater Pittsburgh Illuminating Gas Company has been chartered at Harrisburg. The capital stock is said to be $10,000,000. Those interested in the new company are ex-Judge Reed, Joshua Rhodes, C. L. Magee, George B. Hill & Company, Senator William Flinn, Lyon, Sanderson & McKee, and Parker L. Walter.

LISLE, N. Y.—The electric light question is being agitated here.

NEWTOWN, L. I.—The contract for lighting the streets by electricity was awarded to the Newtown Light and Power Company.

New Electric Railways.

BRIDGEPORT, CONN.—The Traction company is soon to lay double tracks on the lower bridge, after which the entire roadway will be asphalted again.

DETROIT, MICH.—The new electric road to Dearborn is said to be almost an assured fact.

WORCESTER, MASS. — The Consolidated Street Railway proposes to lease the Worcester & Shrewsbury Street Railway Company and the Worcester & Shrewsbury Railroad Company.

WACO, TEX.—The street railway line and electric light plant have been sold to Henry C. Scott, of St. Louis, for $60,000.

TOPEKA, KAS.—With a capital of $75,000, A. J. Arnold, T. M. James, Louis Stair, F. C. Downey and M. T. Campbell, of Topeka, and C. M. Crawford and J. P. Walsh, of Chicago, have incorporated the Topeka Electric Railway Company for the purpose of building a standard or narrow gauge railroad, as the directors may determine, from Topeka to Rossville, where a public park is to be maintained by the management of the road.

PALMETTO, FLA.—The Palmetto Terminal Company has been incorporated to construct telegraph li e.

HOUSTON, TEX.—The Rapid Transit Company will extend its trolley system to the suburbs.

NEW ORLEANS, LA.—The St. Charles Street Railway Company will erect an electric plant to cost $70,000 in construction and machinery.

DANVILLE, IND.—Danville and Hoopeston have been granted franchise to connect the two cities by an electric road.

PHILADELPHIA, PA.—Philadelphia & West Chester Traction Company has been incorporated by W. F. B. Stewart, York, Pa.; W. C. Alderson, Overbrook; W. M. Rotch, Wistar, Germantown, and others. Capital stock, $181,000.

ALGIERS, LA.—Algiers and Gretna will be connected by an electric road. Messrs. Mass and Gerdes have secured franchise to erect poles and string wires for electric purposes.

BROOKLYN, N. Y.—The Long Island Electric Railway Company is laying double tracks on South street, Jamaica, and work is progressing so rapidly that it is expected that the road will be in operation by next week.

NORTHAMPTON, MASS.—Pittsfield and Dalton are soon to be connected by an electric railway, and North Adams and Williamstown will also soon be similarly connected; also Greenfield and Turner s Falls.

ROME, N. Y.—An electric car line between this place and various resorts on Oneida Lake appears to be an assured fact.

BUCYRUS, OHIO.—The Inland Electric Railroad is to run from Bucyrus to Sulphur Springs, and the citizens of the latter place have taken $15,000 worth of stock.

MAITLAND, FLA.—An electric road is to be built, and the route is being surveyed from Sanford to Orlando.

YOUNGSTOWN, OHIO.—The Youngstown Electric Street Railway has secured a franchise from Youngstown council for an extension of its line west to the city limits, the intention being to extend the line through to Girard and Niles, the latter portion being under the control of the Mahoning Electric Railway Company.

BRATTLEBORO, VT.—The Brattleboro Street Railway will build an electric road to be completed June 15.

CLEVELAND, OHIO.—An electric railway will be built immediately between the Tom L. Johnson steel plant at Lorain and this city.

ST. LOUIS, MO.—The Clayton & Delmar Avenue Railway Company has been granted permission to construct an electric road along Bonhomme avenue to Clayton, in the suburbs.

SANDY SPRINGS, MD.—The Tacoma, Burnt Mills and Sandy Springs Railway Company, of Montgomery County, has been incorporated by J. B. Colegrove, M. R. Sliney, Allen Freas, F. Ray Keys and B. H. Colegrove. The proposed road will begin in Montgomery County at a point at the boundary line with the District of Columbia, and extend through Prince George's County to Ellicott City by way of Sandy Springs. Capital stock, $100,000.

ATLANTA, GA.—The Atlanta Street Railroad Company, of which Aaron Haas is president, has secured franchise to build its electric line.

BUFFALO, N. Y.—An experiment will be made with the electric trolley on the Erie Canal between Buffalo and Tonawanda July 1. The electric current will be furnished by the Niagara Falls Power Company.

BOSTON, MASS.—The Commonwealth Avenue Street Railway Company was granted a franchise for a double track electric road on Commonwealth avenue from the Boston line to Washington street, West Newton.

PHILADELPHIA, PA.—The Pikesville, Reisterstown and Emory Grove Electric Railway, which is owned by the Baltimore Traction Company, and with which system it connects in Baltimore, has now been opened to the northern terminus, Emory Grove.

PHILADELPHIA, PA.—Electrical equipment is to displace steam power on the Norfolk and Ocean View Railroad, which is owned and controlled by Philadelphians. The road connects Norfolk with Ocean View.

HARTFORD, CONN.—The Main street trolley lines are now in complete operation.

WANTED—Parties with capital to promote a conduit system of electric railroad. Practical man or contracting firms preferred. No patent sharks need answer. Address

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STATION R, CHICAGO.

NOTICE OF RECEIVERS' SALE.

Electric Light Plant.

Notice is hereby given that the undersigned receiver of all the property and estate of the Hammond Light and Power Company, of Hammond, Lake County, Indiana, heretofore appointed such by the Lake Circuit Court of said County and State in case of Marcus M. Towle *et al vs.* Hammond Light and Power Company *et al*, will offer at public sale to the highest and best bidder upon terms hereinafter expressed on the 23d day of May, 1895, at 10 o'clock A. M., at my office in the said city of Hammond, the following property, to wit: All the property, rights, franchises, privileges, plant, power-house, power-plant, engines, dynamos, machinery, boilers, poles, wires and all fixtures and appliances owned by said Hammond Light and Power Company, including as well its franchise from said city of Hammond, and its franchise from the Board of Commissioners of Lake County, and also its real estate, being lots 20, 21, 22 and 23 in Block 17 of the re-subdivision of the east part of North Side Addition to the town (now city) of Hammond, Lake County, Indiana; excepting, however, all choses in action, book accounts and other accounts and bills receivable of said company. Said property to be sold subject to a mortgage indebtedness of $30,000 and for not less than $10,000. A deposit of $2,000 in cash or certified check for that amount shall be required of each bidder before receiving bids, said sum to be applied to the purchase price of successful bidder, and the deposit of other bidders returned to them at once. The further sum of $4,000 to be paid receiver upon confirmation of sale by said court, and balance of purchase price to be paid 45 days from the date of confirmation of such sale. Successful bidder may turn in to receiver as cash any claims that will then have been adjudicated by said court, which he may hold at the proper *pro rata* share that such claims are entitled to upon distribution to be fixed by the court. Said sale to be made in conformity with the order of said court, entered May 9, 1895.

Address all inquiries to the undersigned,

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KINDRED INTERESTS

Thomas Slaight, 113 New Jersey Railroad avenue, Newark, N. J., is sending out circulars describing hardware specialties for railway cars.

The Billings & Spencer Company, of Hartford, Conn., has gotten up a very neat paper-weight, formed of one of its drop forged copper commutator segments.

The H. W. Johns Manufacturing Company, 87 Maiden Lane, New York city, has issued a neat card calling attention to the Vulcabeston insulation for various purposes.

The Jeffrey Manufacturing Company, of Columbus, Ohio, has issued a catalogue of its labor-saving appliances in the line of chain and cable conveyors and power transmission machinery.

The Boudreaux Dynamo Brush Company has given the sole agency for the Dominion of Canada to R. E. T. Pringle, Montreal, Que. It is expected that the brush will meet with the same favor it has received in this country.

Mr. Harry M. Shaw is now manufacturing the universal non-arcing railway and central station lightning arrester, with offices at 136 Liberty street, New York. Mr. Shaw has also been appointed New York agent for the Medbury insulation, manufactured by the Fiberite company, of Mechanicsville, N. Y.; also New York agent for Partridge Carbon Company, Sandusky, and the Wagner Electric and Manufacturing Company, of St. Louis.

The Commercial Electric Company, of Indianapolis, Ind., have issued a new catalogue illustrating and describing their new multipolar dynamos and motors for power, lighting and railway purposes. They are building these in a large number of sizes for both direct connection and belt driving, as is shown by the tables in the latter part of the catalogue. The catalogue also contains some new matter and cuts in regard to their moderate-speed B. P. dynamos and motors.

The Western Electric Company is to build a new two-story factory at 242 to 258 Jefferson street, Chicago. It is to be used as a factory, offices and blacksmith shop, and will cover an area of 180 by 49 feet and 50 by 50 feet, the latter being the two-story building to be used as the blacksmith shop. The total cost will be $140,000. The same company also secured a permit to build two additional stories on their factory at 37 and 39 West Congress street. These alterations will cost $7,000.

The White-Crosby Company, contracting engineers of Baltimore, New York and Chicago, have in hand a number of important electric railway contracts which they have closed this Spring. Among these is a contract for the Buffalo & Niagara Falls Electric Railway, which includes the entire construction and furnishing of motors and cars. The road will have 30 miles of track, to be laid throughout with 73-pound girder rail, in 60 feet lengths, and will have stone ballast. This road connects at either end with the electric roads of Buffalo and Niagara Falls, and between the city limits of these points is expected to make 30 or 35 miles an hour. The White-Crosby company also have a contract for 16 miles of "T" rail construction for the Atlantic Highlands, Red Bank & Long Branch, N. J., road, which includes motors, cars and buildings. This road is to be first class in every respect, and will cater particularly for the Summer business connecting with the boats from Atlantic Highlands and Red Bank for all the Summer resorts between these points and Long Branch. They are finishing up at Baltimore several contracts for the Baltimore Traction Company, including the changing over of one of their cable lines to an electric line, shifting some of their cable track and stringing a large amount of additional feeder wire. They are also finishing up a contract for the City & Suburban road at Baltimore for the erection of 70 miles of 4/0 feeder wire and about 15 miles of 500,000 circular mills cable. The company have now in hand contracts amounting to about $100,000 with the Baltimore City Passenger Railroad, which includes an extension of two miles, stringing a lot of additional feeder wire from their power house to operate this extension, and giving them increased feeder capacity for some of their other lines.

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The surrounding grounds, as well as the hotel, are lighted with electricity. Six miles distant, on the same mountain summit, is Oakland, the twin resort of Deer Park, and equally as well equipped for the entertainment and accommodations of its patrons. Both hotels are upon the main line of the Baltimore and Ohio Railroad, have the advantages of its splendid Vestibuled Limited Express trains between the East and West. Season Excursion tickets, good for return passage until October 31, will be placed on sale at greatly reduced rates at all principal ticket offices throughout the country. One-way tickets, reading from St. Louis, Louisville, Cincinnati, Columbus, Chicago and any point on the B. & O. system to Washington, Baltimore Philadelphia or New York, or *vice versa*, are good to stop off at either Deer Park, Mountain Lake Park or Oakland, and the time limit will be extended by agents at either resort upon application, to cover the period of the holder's visit.

The season at these popular resorts commences June 22.

For full information as to hotel rates, rooms, etc., address George D. DeShields, manager, Deer Park, or Oakland, Garret County, Md.

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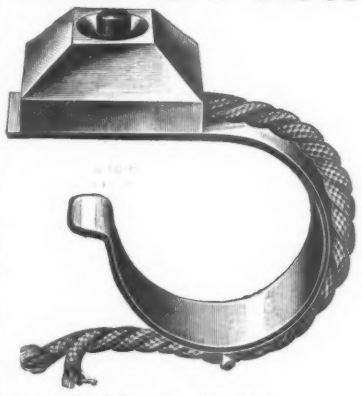

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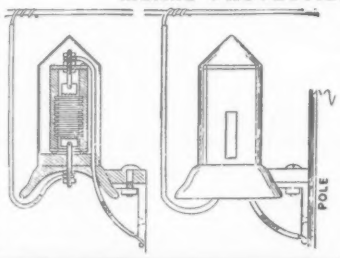

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